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### CB/CFE/CFi Service Manual

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### CB - CFE - CFi Lenses

29/97	New lenses - CB 2.8/80, CB 3.5/60, CB 4.8/160
33/97	Preliminary spare part catalogue - CB 2.8/80
07/98	New tools - CB 2.8/80 and CB 4.8/160
06/99	New spare part catalogue - CB, CFE and CFi lenses
15/99	Service Manual completed - CB, CFE and CFi lenses
01/00	New CD-ROM - Version 1.2
09/00	New CD-ROM - Version 1.3
10/00	Service Policy - C lenses
03/01	Modified shutter parts
04/01	New CD-ROM - Version 2.0

## CB/CFE/CFi Service Manual

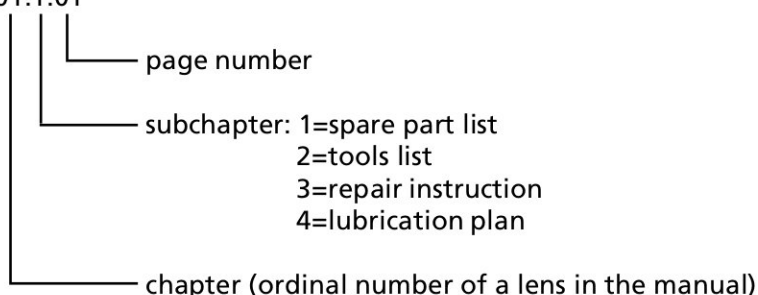
This Service Manual comprises a spare parts catalogue, a tools catalogue, a repair instruction and a lubrication plan. Determinant for the availability of spare parts is the latest state effective of the spares price list, as may from time to time be established.

The basic lens for lists and descriptions is the Planar 2,8/80 CB. The lists and descriptions of the remaining lenses are showing only the differences to the Planar 2,8/80 CB. That means: What you don't find in the chapter of one lens you will find in the Planar 2,8/80 CB chapter.

All repair descriptions deal with disassembly only. Assembling is therefore always carried out in the reverse order. Exceptions are mentioned by the text.

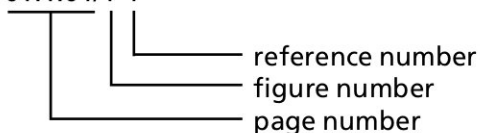
### Page numbering system

01:1:01



### Figure numbering system

Fig. 01:1:01/1-1



### Ordering numbers

The spare parts and tools have 13-digit ordering numbers like '102165-0011-180'. There are two exceptions: Some parts have a format like 'VHAB Code No. 50377' which you will find in the remark column. Some parts have a format like '200 509', then you will find 'VHAB Spare Part No.' in the remark column.

### Revisions and dates

To make sure, that your Service Manual is always up to date every page has a Revision counter and a date field. On the next pages you will find the **Index of Current Pages**, that gives you an overview over the complete Service Manual and informs you what to do in case of changes.

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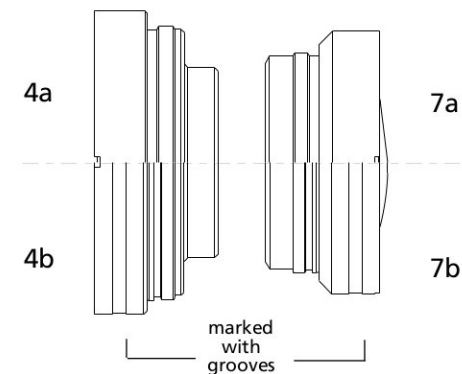
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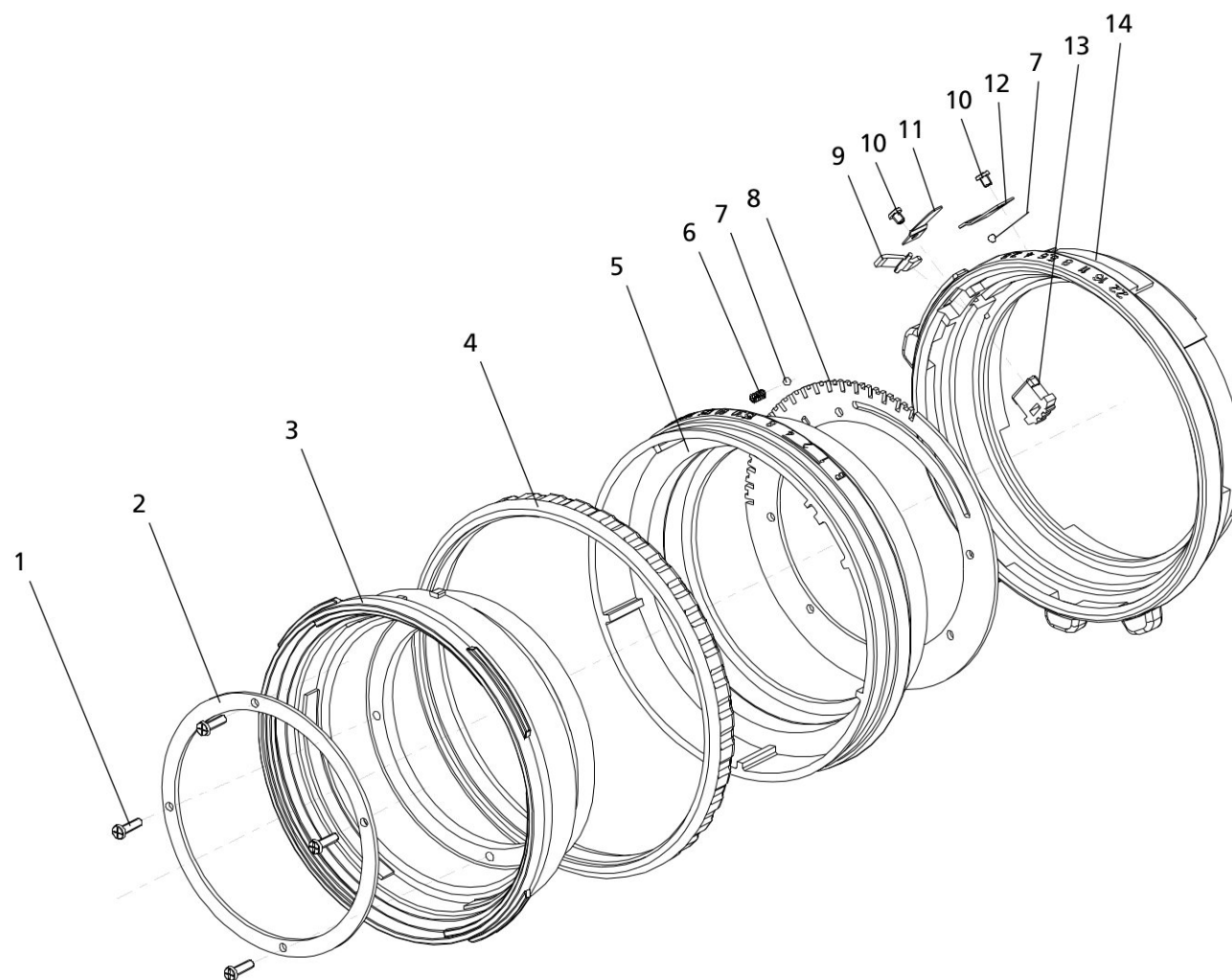
Pos No.	Pcs	Spare Part No.	Description	Remark
1	1	-	Front lens guard	VHAB Code No. 51643
2	1	102165-0011-180	Engraved ring	
3	1	102165-0012-030	Snap ring	
4a	1	102212-8105-000	Front lens element	replace it by the same type (without groove)
4b	1	000000-1018-370	Front lens element	replace it by the same type (with groove)
5	1	102212-0011-000	Lens holding ring	
6	1	102212-0001-000	Front lens	
7a	1	102212-8106-000	Rear lens element	
7b	1	000000-1018-373	Rear lens element	
8	1	102212-0006-000	Rear lens	
9	1	102212-0016-000	Lens holding ring	VHAB Code No. 50377
10	1	-	Rear lens guard	

**01:1:02**



Pos No.	Pcs	Spare Part No.	Description	Remark
1	4	000000-0069-933	Screw	
2	1	102211-1059-000	Holding disk	
3	1	102212-1058-000	Holding ring	
4	1	102211-1542-000	Grip ring	
5	1	100349-1539 010	Setting ring	
6	1	109950-0389-000	Spring for setting notch	
7	1+1	109950-0623-000	Ball	
8	1	109950-0390-000	Notched ring	
9	1	102211-1177-000	Clutch lever	
10	2	000000-0098-765	Screw	
11	1	102211-1057-000	Clutch spring	
12	1	102211-1056-000	Notch spring	
13	1	102211-1522-000	Notch knob	
14	1	000000-1008-959	Diaphragm clutch ring	

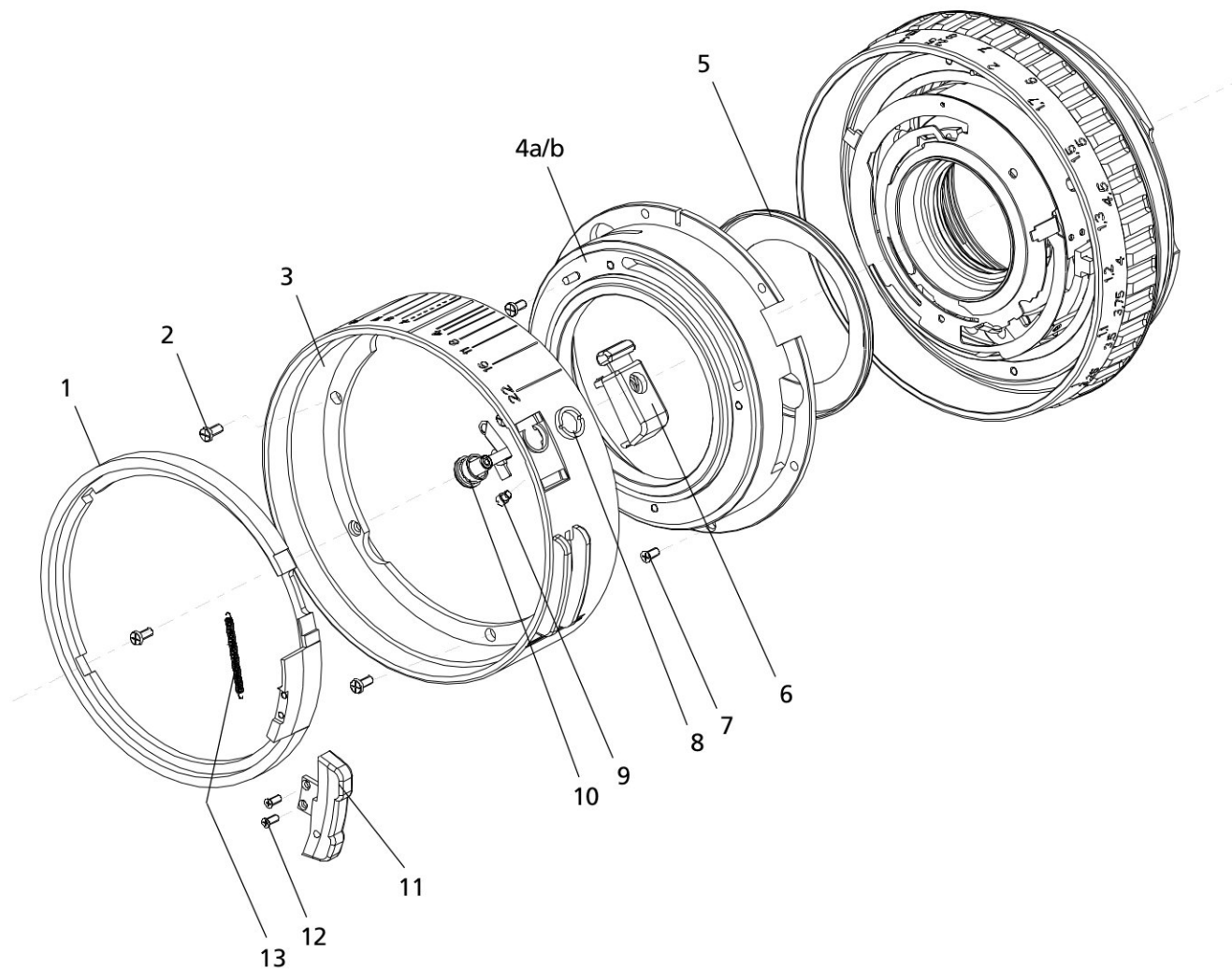
# Planar 2,8/80 CB



Pos No.	Pcs	Spare Part No.	Description	Remark
1	1	102211-1054-000	Stop down ring	replace it by the same type (lens elements without grooves) replace it by the same type (lens elements with grooves) Pos No. 4a/b has to be exchanged together with shutter mount
2	3	000000-0400-789	Screw	
3	1	102212-1744-010	Depth of field ring	
4a	1	000000-1033-343	Case + shutter mount	
4b	1	000000-1033-344	Case + shutter mount	
5	1	109950-0378-000	Cover plate	
6	1	102211-8620-000	Flash housing	
7	1	109951-0042-000	Countersunk screw	
8	1	109950-0626-000	Nut	
9	1	000000-0088-208	Screw	
10	1	102211-8675-000	Flash contact, riveted	
11	1	102211-8553-000	Stop down handle	
12	2	000000-0190-005	Countersunk screw	
13	1	102211-1829-000	Spring for stop down ring	

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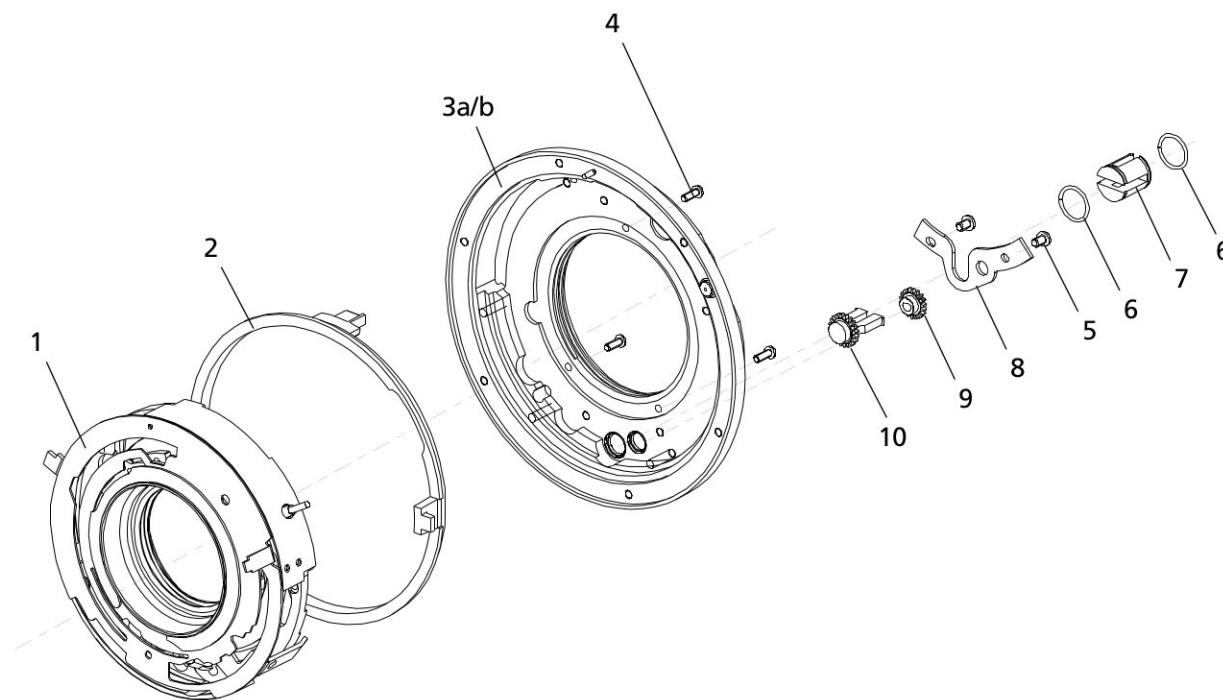
## Planar 2,8/80 CB



Pos No.	Pcs	Spare Part No.	Description	Remark
1	1	102212-8602-000	Shutter unit	replace it by the same type (lens elements without grooves) replace it by the same type (lens elements with grooves) Pos No. 3a/b has to be exchanged together with case
2	1	102211-1037-000	Intermediate stop down ring	
3a	1	000000-1033-343	Shutter mount + case	
3b	1	000000-1033-344	Shutter mount + case	
4	3	000000-0096-457	Screw	
5	2	000000-0088-598	Screw	
6	2	102211-1068-000	Stop ring	
7	1	102211-1067-000	Intermediate telescope shaft	
8	1	102211-1910-000	Bracket	
9	1	109950-0334-000	Pinion for cocking shaft	
10	1	102211-1062-000	Cam	

01:1:08

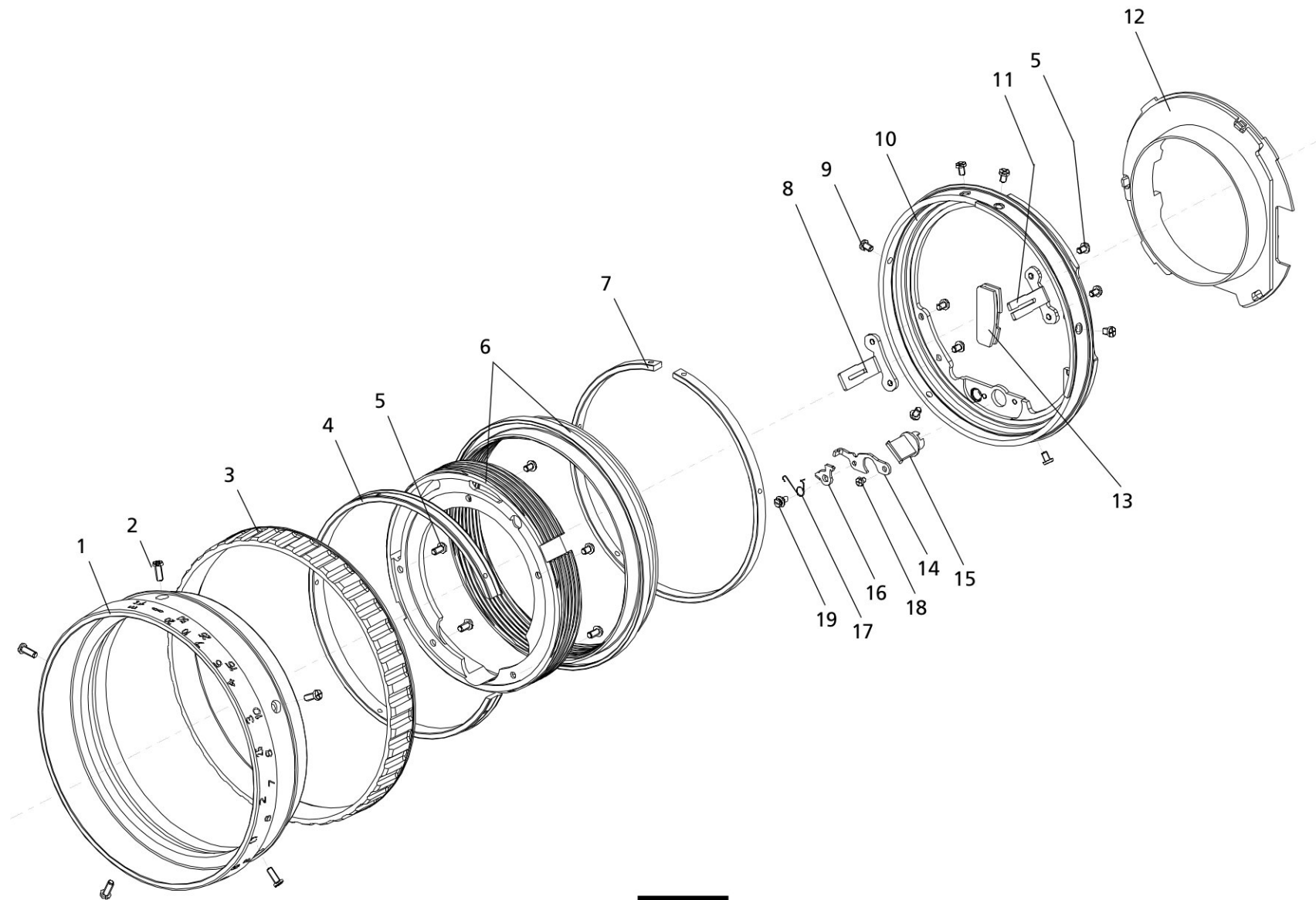
## Planar 2,8/80 CB



Pos No.	Pcs	Spare Part No.	Description	Remark
1	1	102211-1026-010	Focusing ring	
2	5	000000-0069-908	Screw	
3	1	102211-1036-000	Focusing grip ring	
4	1	109950-0327-000	Clamp ring	
5	5	000000-0088-598	Screw	
6	1	102211-8574-000	Focusing mount	
7	1	102211-1020-000	Bearing	
8	1	109950-0320-000	Guide bar	
9	6+4	000000-0088-598	Screw	
10	1	000000-1008-958	Bayonet plate	
11	1	109950-0344-000	Guide bar	
12	1	102211-1072-000	Light tunnel	
13	1	102212-8900-000	Contact dummy	
14	1	109950-0341-000	Holding plate	
15	1	000000-1008-957	Telescope shaft	
16	1	109950-0342-000	Latch	
17	1	109950-0114-000	Latch spring	
18	1	000000-0093-536	Screw	
19	1	109950-0343-000	Latch bearing screw	

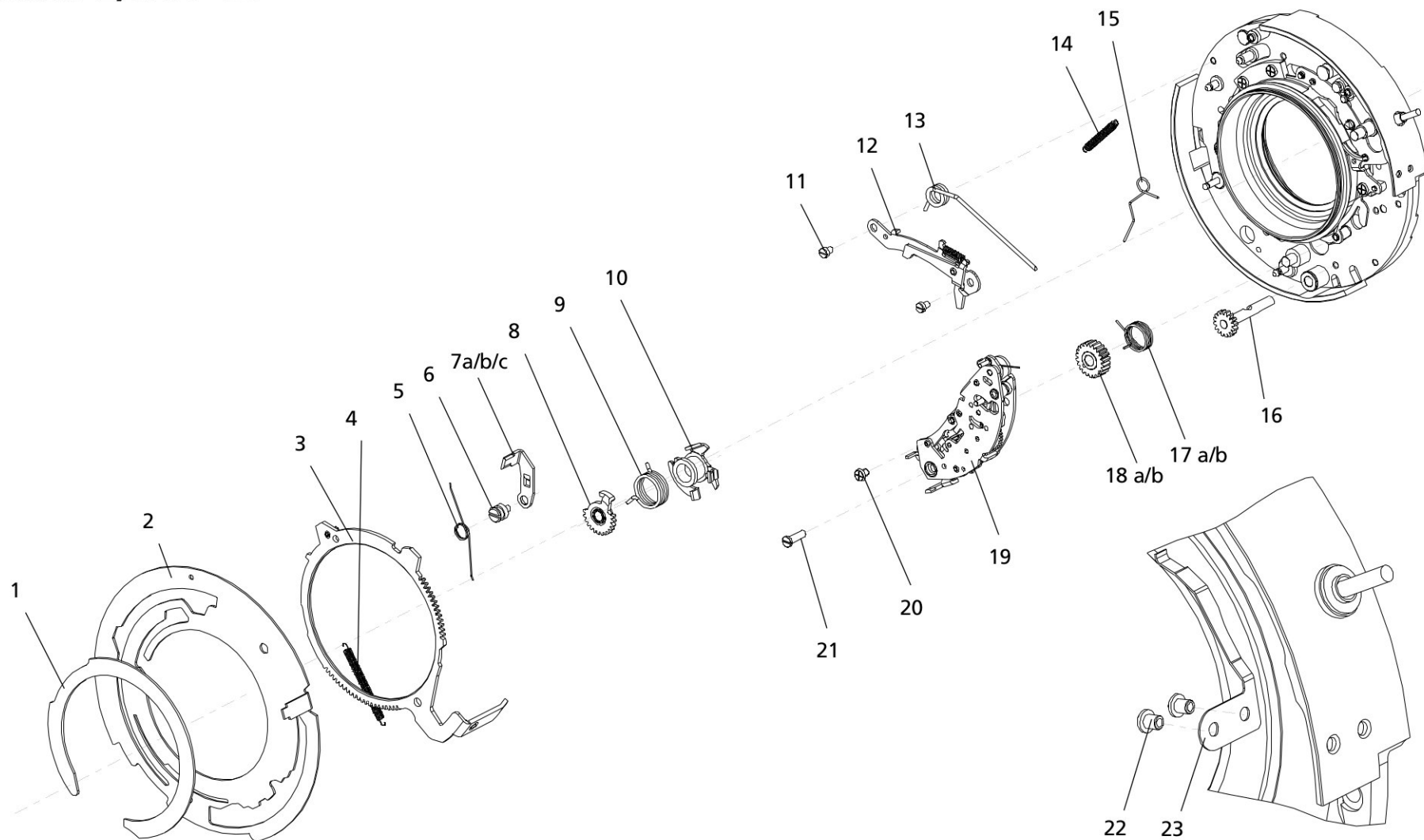
# Planar 2,8/80 CB

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Pos No.	Pcs	Spare Part No.	Description	Remark
1	1	109950-0611-000	Securing ring	
2	1	109950-0702-000	Cam ring	
3	1	109950-0703-000	Cocking ring	
4	1	109950-0370-000	Cocking ring spring	
5	1	109950-0619-000	Speed lever spring	
6	1	109950-0617-000	Speed lever screw	Selection stage III, 2 notches Selection stage II, 1 notch Selection stage without notch
7a	1	109950-0614-000	Speed lever	
7b	1	109950-0615-000	Speed lever	
7c	1	109950-0616-000	Speed lever	
8	1	000000-1026-076	Cocking gear	see repair instructions
9	1	102211-1515-000	Drive spring 1	
10	1	109950-0369-000	Drive	
11	2	109950-0007-000	Screw	
12	1	109950-0624-000	Bridge	
13	1	109950-0368-000	Drive spring 2	16 selection stages (XXX=000...160, see repair instructions) replace it together with Pos. 18a (old version) replace it together with Pos. 18b (new version)
14	1	109950-0363-000	Spring for blade opening ring	
15	1	109950-0037-000	Closing spring	
16	1	109950-0064-XXX	Cocking shaft	
17a	1	000000-1008-960	Spring for intermediate cocking gear	
17b	1	000000-1109-777	Spring for intermediate cocking gear	replace it together with Pos. 17a (old version) replace it together with Pos. 17b (new version)
18a	1	109950-0371-000	Intermediate cocking gear	
18b	1	000000-1109-776	Intermediate cocking gear	
19	1	109950-0707-000	Retard gear train	
20	1	000000-0093-536	Screw	
21	1	109950-0004-000	Countersunk screw	
22	2	109950-0013-000	Cylinder head rivet	
23	1	109950-0734-000	Flash contact spring	

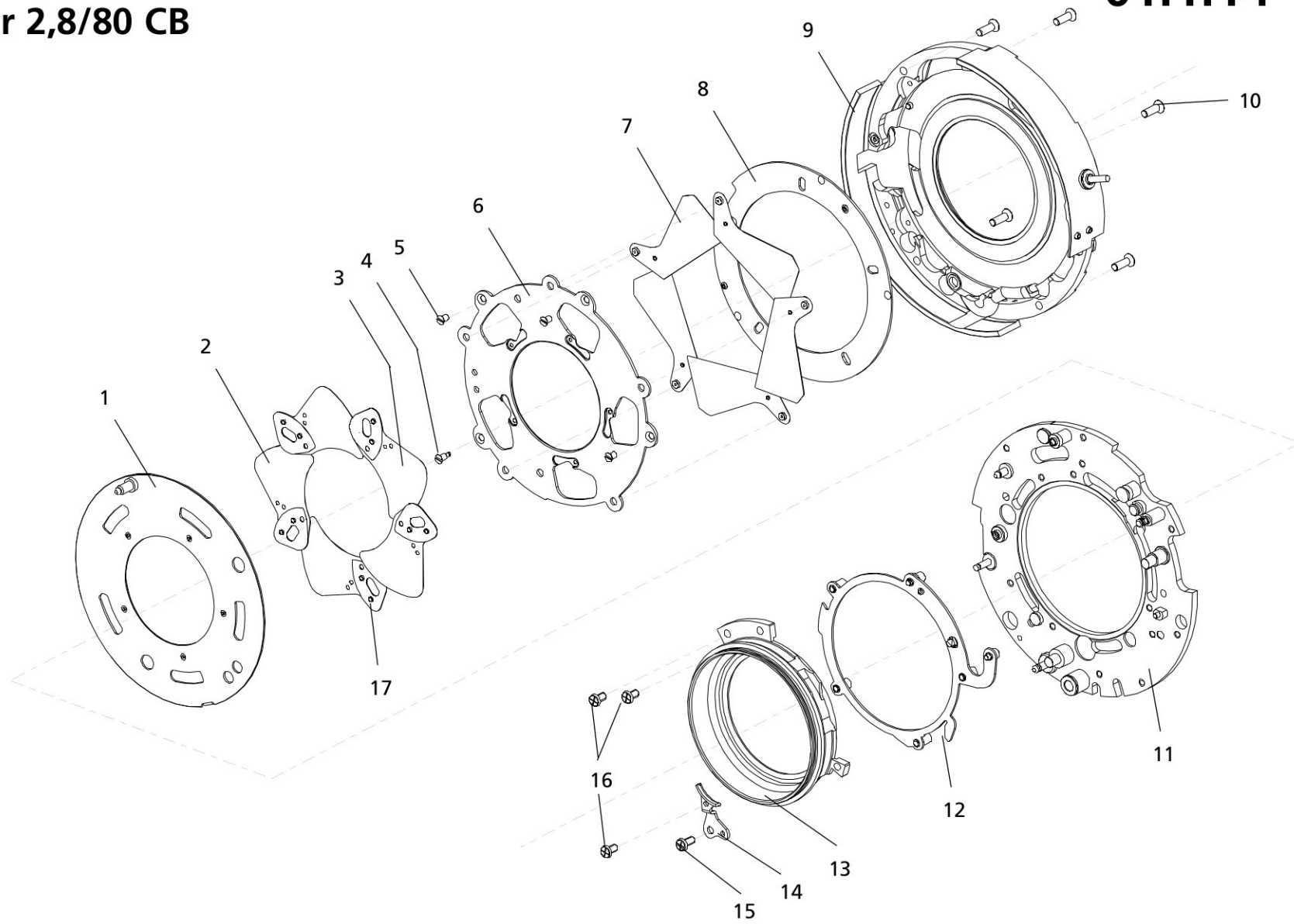
## Planar 2,8/80 CB



Pos No.	Pcs	Spare Part No.	Description	Remark
1	1	109950-0362-000	Blade opening ring	
2	1	109950-0365-000	Blade	
3	3	109950-0361-000	Blade	
4	1	109950-0604-000	Tap screw	
5	3	109950-0032-000	Countersunk screw	
6	1	109950-0854-000	Blade cover disc	
7	5	109950-0348-000	Diaphragm blade	
8	1	109950-8024-000	Diaphragm disc	
9	1	000000-1033-458	Case	
10	5	109950-0815-000	Countersunk screw	
11	1	109950-0358-000	Base plate	
12	1	109950-0705-000	Blade ring	
13	1	109950-0704-000	Mount tube	
14	1	109950-0042-000	Stop plate	
15	1	000000-0069-975	Screw	
16	3	000000-0093-538	Screw	
17	1	109950-0364-000	Blade	

01:1:14

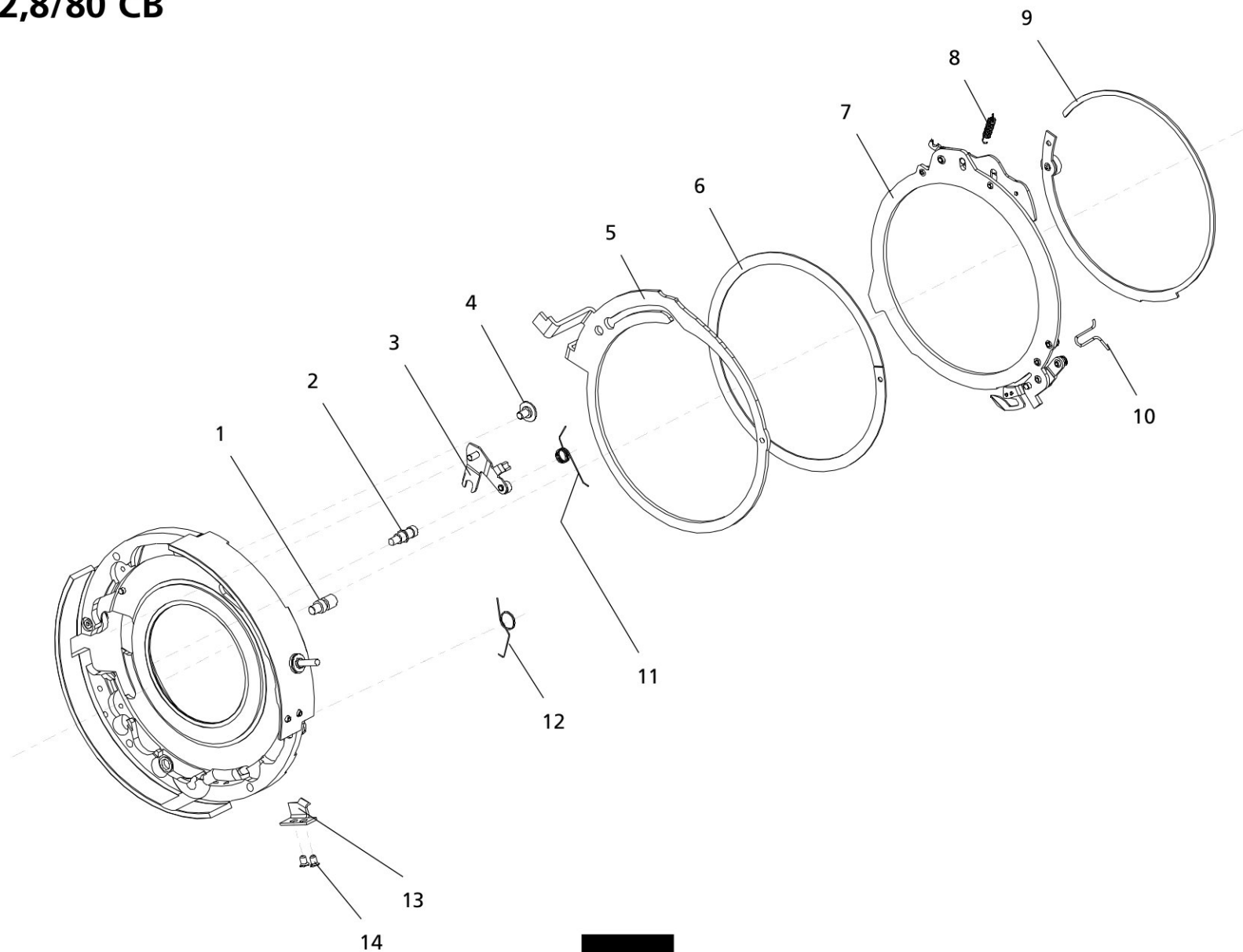
## Planar 2,8/80 CB



Pos No.	Pcs	Spare Part No.	Description	Remark
1	1	109950-0353-000	Fixing screw	
2	1	109950-0649-000	Collar screw	
3	1	109950-0350-000	Diaphragm lever	
4	1	109950-0352-000	Diaphragm lever screw	
5	1	102211-1108-000	Diaphragm ring	
6	1	109950-0355-000	Securing ring	
7	1	102211-8548-000	Control ring	
8	1	109950-0833-000	Opening lever spring	
9	1	102211-8528-000	Securing ring 2	
10	1	102211-1766-000	Override pawl spring	
11	1	000000-1026-108	Diaphragm spring	
12	1	109950-0366-000	Locking lever spring	
13	1	102211-1150-000	Locking pawl	
14	2	000000-0190-005	Countersunk screw	

01:1:16

# Planar 2,8/80 CB



Pos No.	Pcs	Tool No.	Former Tool No.	Description	Remark
1	1	V-2180	-	Measuring device for planartrueness and concentricity	
2	1	V-2223	-	Standard gauge	
3	1	000000-1033-916	1450/8 493 916 and 109950-0712-000	Diaphragm setting gauge with gauge pivot	
4	1	109950-0716-000	1450/8 385 614	Grooved ring wrench for X-contact	
5	1	109950-0723-000	1450/8 386 818	Cocking button	
6	1	109950-0724-000	1450/8 386 821	Cocking and release key	
7	1	109950-0722-000	1450/8 386 806	Cocking and release key	
8	1	109950-0718-000	1450/8 385 638	Control pawl and retard gear train bending tool	only for CFE and CFi lenses
9	1	109950-0715-000	1450/8 385 602	Locking lever adjuster	
10	1	109950-0719-000	1450/8 385 641	Control lever latch bending tool	only for CFE and CFi lenses
11	1	109950-0713-000	1450/8 385 588	Diaphragm setting key	
12	1	109950-0750-000	1450/8 416 115	Auxiliary cam	
13	1	109950-0688-000	1450/8 387 176	Centering pin	
14	1	109950-0721-000	1450/8 386 795	Auxiliary ring	for repair with open shutter
15	1	109950-0725-000	1450/8 386 833	Retard lever pin bending tool	for adjustment of 1/15s
16	1	109950-0726-000	1450/8 386 845	Retard lever pin bending tool	for adjustment of 1/500s
17	1	102165-0000-901	-	Wrench for engraved ring	
18	1	102212-8105-901	-	Wrench for front element	
19	1	102212-8106-901	-	Wrench for rear element	

## General

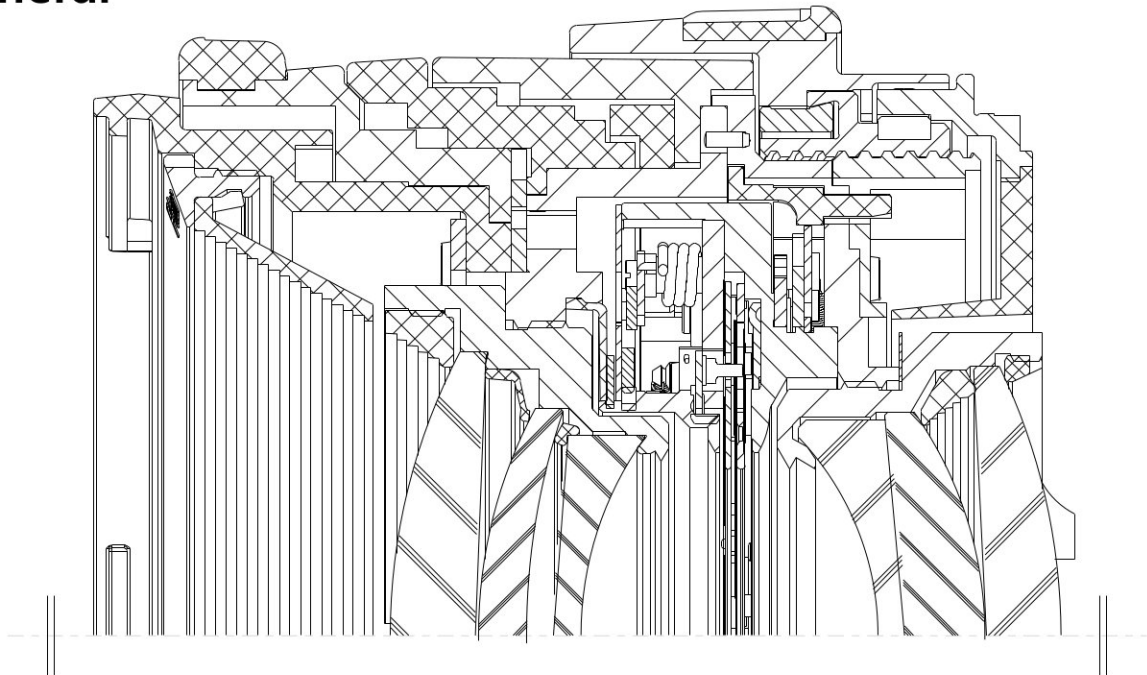


Fig. 01:3:01/1

### General instructions for repair works

It is recommended to do a receipt inspection before starting repair works. Additional faults could be recognized and the appearance of the faults could give hints to consequential damages. After any repair work a final inspection has to be done.

### General instructions for repair works on the barrel

- Only screws with securing adhesive are mentioned in the text. All other screws are screwed in without securing adhesive.
- The flash contact must be free of lubricant.
- The shutter blades and the diaphragm blades and their bearing points must be free of lubricant.
- Lubrication of shutter parts only according to "Lubrication Plan".
- It is recommended to change the drive spring 1 (Spare Part No. 102211-1515-000) doing repair works on the shutter unit. **Please see repair instructions "Exchange of drive spring 1".**
- For works at the printed circuit boards of the CFE lenses: to avoid damages of the IC's from electrostatic discharge observe the general instructions for ESD prevention.
- Check of shutter speed.
- Cock the shutter, actuate stop-down handle, rotate smoothly the diaphragm ring and check at the same time whether the diaphragm blades open easily, consistently and fully.
- Close the diaphragm; diaphragm blades should move consistently and jerk-free.
- Release stop-down handle; diaphragm blades should open fully.
- Check flash contact.
- **After** repair works check dimensions related to lens bayonet flange, planartrueness and concentricity (Tool No. V-2180).
- Check functions with standard gauge (Tool No. V-2223). See instructions for standard gauge.
- Check lens adjustment with collimator.
- For maximum optical performance MTF equipment is recommended to use.

## General

Check of planartrueness, concentricity, and flange focal length

Lens			Flange focal length	L1	L2 max.	CC	PL	Threads	Version
Planar	2,8/80	CB	74.9 ±0.05	26 ±0.015	31	0.02	0.015	trapezoidal	a (01:1:02)
Planar	2,8/80	CB	74.9 ±0.05	26 ±0.015	31	0.02	0.015	metric	b (01:1:02)
Tessar	4,8/160	CB	74.9 ±0.05	26 ±0.02	68.8	0.02	0.015	trapezoidal	a (02:1:02)
Tessar	4,8/160	CB	74.9 ±0.05	26 ±0.02	68.8	0.02	0.015	metric	b (02:1:02)
Makro-Planar	4/120	CB	74.9 ±0.05	26 ±0.015	65.6	0.02	0.015	metric	
Planar	2,8/80	CFE	74.9 ±0.05	26 ±0.015	31	0.02	0.015	trapezoidal	
Planar	3,5/100	CFi	74.9 ±0.05	26 ±0.015	43.1	0.02	0.015	metric	
Makro-Planar	4/120	CFi	74.9 ±0.05	26 ±0.015	65.6	0.02	0.015	metric	
Sonnar	4/150	CFi	74.9 ±0.1	26 ±0.02	57.3	0.02	0.015	metric	
Sonnar	4/180	CFi	74.9 ±0.1	26 ±0.015	65.5	0.02	0.015	metric	
Sonnar	5,6/250	CFi	74.9 ±0.1	26 ±0.02	80.9	0.02	0.015	metric	

Threads	TH1	D1	TH2	D2
metric	M42x0.75	42.1	M33.5x0.5	33.6
trapezoidal	TG41.5x1.5	41.7	TG33.5x1.5	33.7

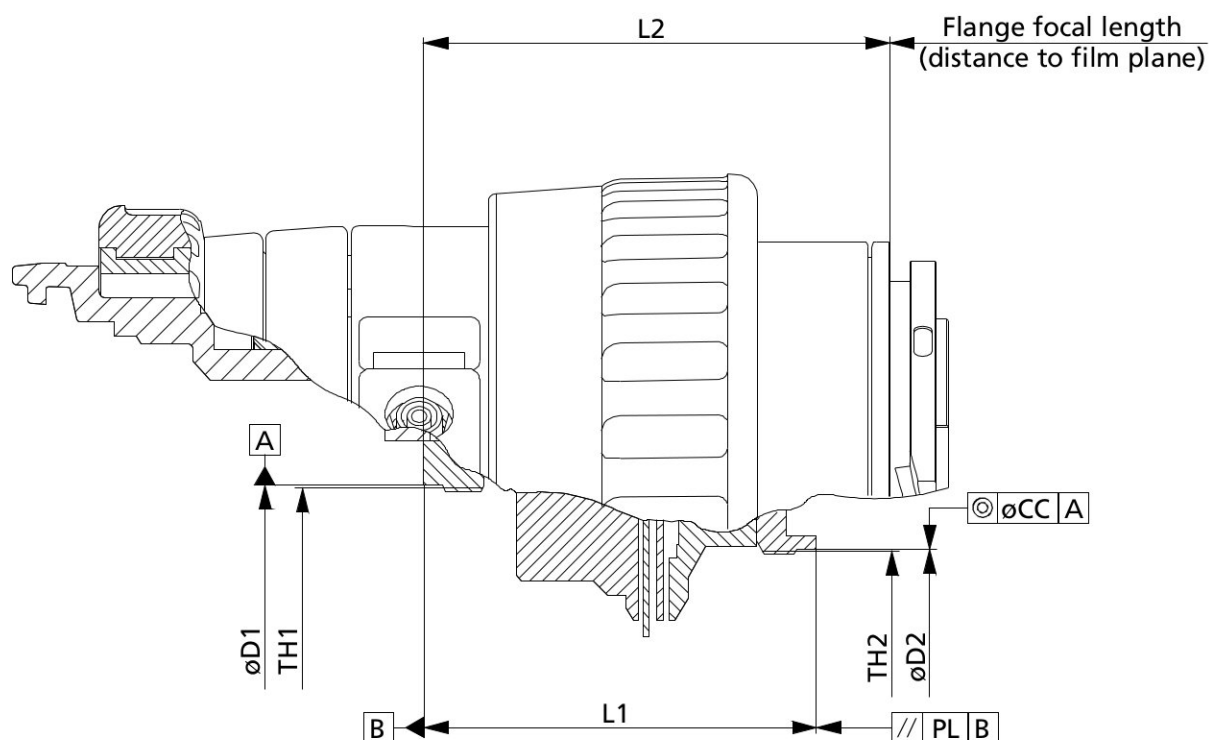


Fig. 01:3:02/1

## General

Lens			Flange focal length	L1	L2 max.	L3	CC	PL
Distagon	3,5/60	CB	74.9 ±0.05	26.9 ±0.01	31.9	38.5	0.005	0.01
Distagon	4/40	CFE	74.9 ±0.05	26.9 ±0.01	36.6	20.6	0.005	0.005
F-Distagon	3,5/30	CFi	74.9 ±0.05	26.9 ±0.01	49.5	31.4	0.005	0.005
Distagon	4/50	CFi	74.9 ±0.05	26.9 ±0.01	32.4	20.6	0.01	0.01

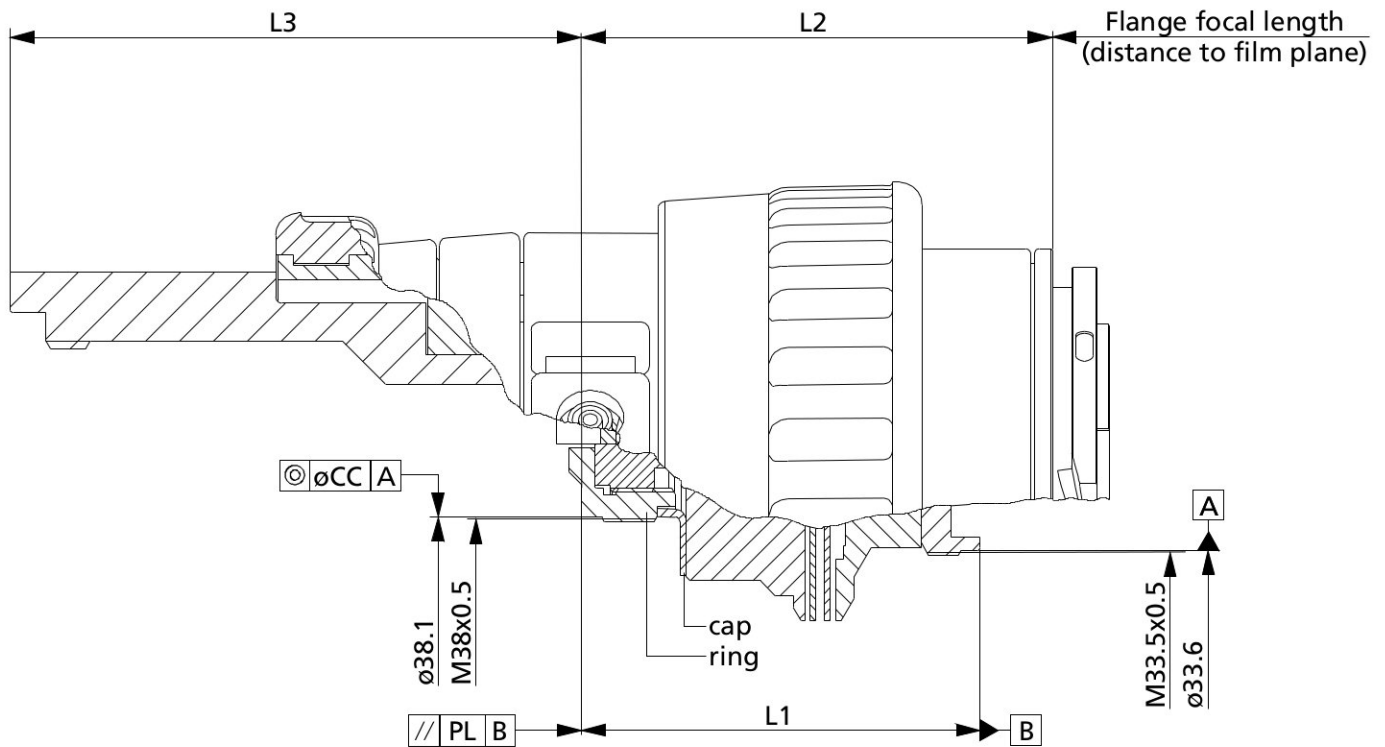


Fig. 01:3:03/1

### General

#### Cleaning and exchange of lens elements

Use a suction lifter for removing of lens elements. The surface of the lens elements has to be cleaned before mounting.

The following tools are necessary for dismantling and mounting of lens elements:

##### Front lens element / Front lens

##### Tool No.

- Unscrew engraved ring  
(snap ring is snapped in from the rear)
- Unscrew front lens element
- Unscrew lens holding ring
- Remove front lens
- Assembly is carried out in the reverse sequence analogously.

102165-0000-901

102212-8105-901

##### Rear lens element / Rear lens

##### Tool No.

- Unscrew rear lens element
- Unscrew lens holding ring
- Remove rear lens
- Assembly is carried out in the reverse sequence analogously.

102212-8106-901

### General

#### Removal of shutter unit

- Remove lens elements.
- Release shutter.
- Unscrew 4 screws of holding disk (from the front).
- Remove holding disk.
- Remove setting ring (mind the ball and spring of the notch).
- Remove diaphragm clutch ring and notched ring.
- Unscrew stop down handle.
- Remove spring and stop down ring.
- Unscrew 3 screws (01:3:05/1-1) of depth of field ring and one for grounding of flash contact (01:3:05/1-2), and remove depth of field ring.
- Unscrew one countersunk screw (01:3:05/1-3), one cylinder head screw (01:3:05/4) and remove case.
- Unscrew 3 screws from the back (at the shining surface).
- Remove shutter unit from the front.
- Assembly is carried out in the reverse sequence analogously (mind the ball in the setting ring).

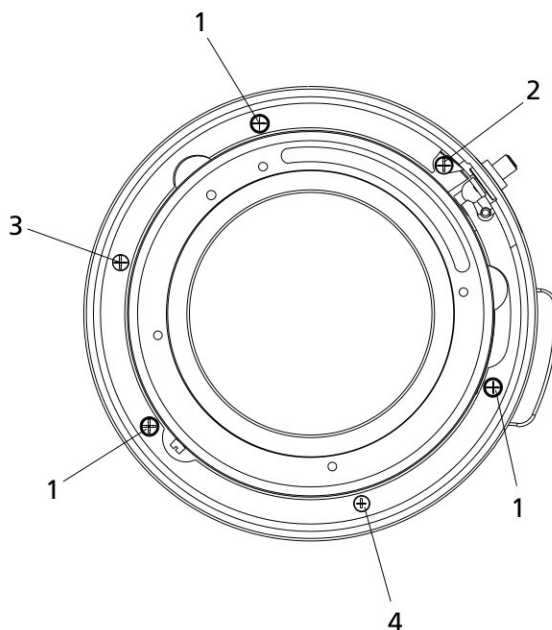


Fig. 01:3:05/1

## General

**Recommendation:** Mark position of cocking shaft before disassembly of cocking ring (otherwise index will be disoriented by  $\pm 1$  tooth).

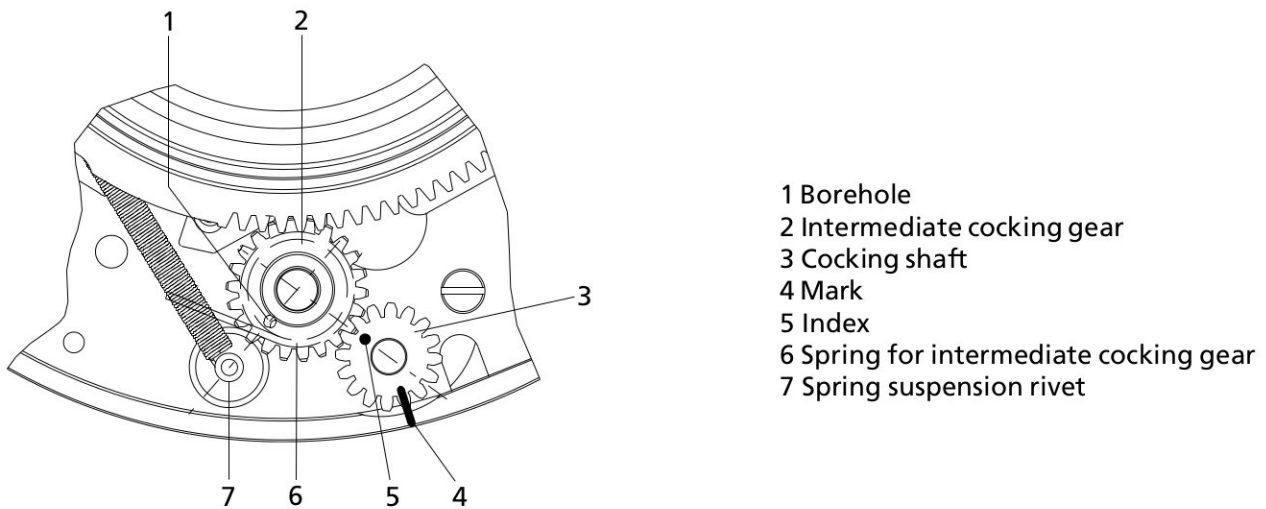


Fig. 01:3:06/1

- Test planartrueness and concentricity after fixing of case.

## Removal of flash socket

- Snap out flash housing from the inside of depth of field ring with a wide screw driver.
- Unscrew nut with special tool (Tool No. 109950-0716-000, Former Tool No. 1450/8 385 614). For assembly, the nut has to be secured.

## Removal of bayonet plate and focusing ring

- Release shutter.
- Snap out light tunnel.
- Unscrew 5 screws (mind the different length of 2 and 3).
- Remove focusing assembly by drawing it over the stop of the telescope shaft.
- Remove grip ring.
- Loosen 5 clamp screws around the focusing ring.
- Remove focusing ring.

## General

### Exchange of telescope shaft:

- Clinch the screw (01:3:07/1-1) from the outside after assembly.

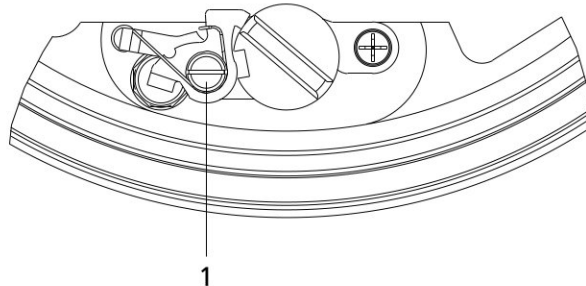


Fig. 01:3:07/1

- Screw in (for example after cleaning) of focusing mount is possible in any thread (For focal lengths 40, 50, 60, 80).
- Assembly is carried out in the reverse sequence analogously.
- Push the bayonet plate over the bearing and fix the screws under axial pressure. Mind the order.

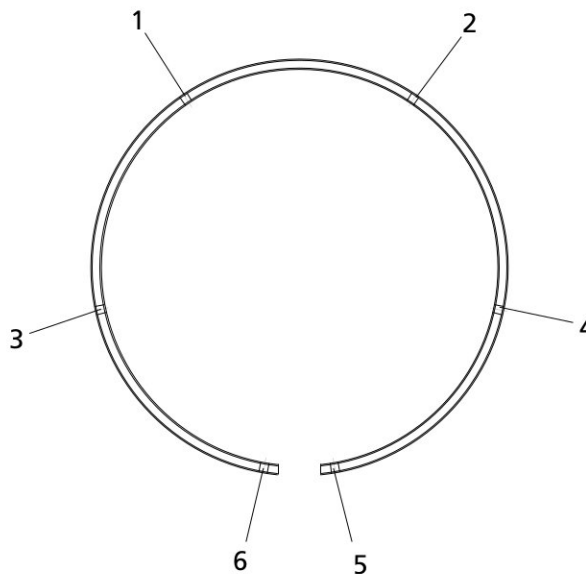


Fig. 01:3:07/2

- Slip the focusing ring over the threaded ring and turn it clockwise until the stop.
- Fix the clamp screws and mind the order (see section "Adjustment of the focusing ring").

## General

- Screw focusing assembly onto the case (all 5 screws have to be secured). Mind the right position of the notch of the telescope shaft.

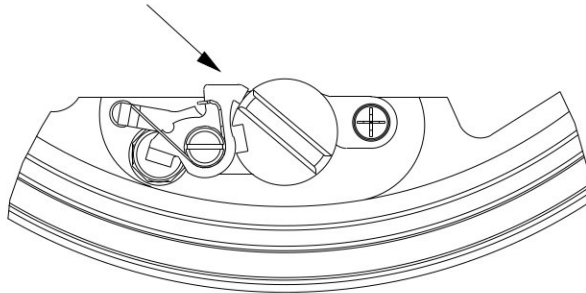


Fig. 01:3:08/1

- Insert the telescope shaft and push it over the stop.

## Dismounting of Case

- See "Disassembly of shutter unit".
- See "Removal of bayonet plate and focusing ring".
- For assembly mind the position of the cam and the pinion. Turn the cam until the inner face of the pinion is in parallel to the outside and the face of the cam is at an angle of 40° towards the center line.

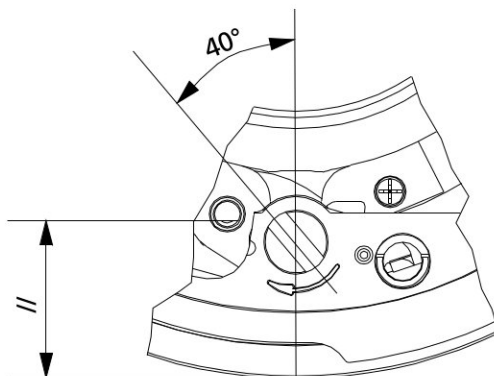


Fig. 01:3:08/2

## Adjustment of the focusing ring

- Remove the focusing grip ring.
- Set the focusing ring at  $\infty$ .
- Loosen 5 clamp screws.
- Turn away focusing ring by approx. 45° from the stop and secure by one clamp screw..

## General

- Adjust  $\infty$  by turning the focusing ring.
- Loosen the clamp screw and turn focusing ring towards the  $\infty$ -stop.
- Tighten all clamp screws (mind the order).

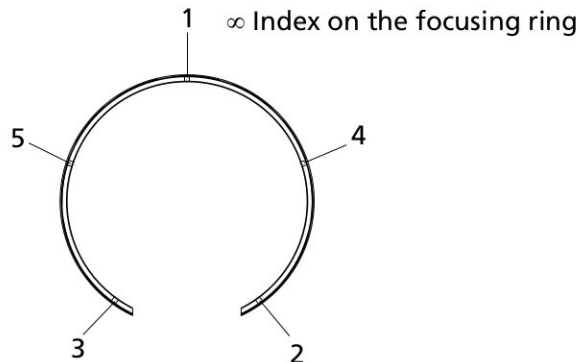


Fig. 01:3:09/1

## Disassembly of shutter unit

### Exchange of blades and blade opening ring

- Dismount securing ring and cam ring.
- Recommendation: Mark position of cocking pinion.
- Dismount cocking ring with cocking ring spring.
- Remove speed lever spring.
- Dismount securing ring 2 and control ring from the back of the shutter.
- Dismount securing ring 1 and diaphragm ring.

### Exchange of shutter blades

- Mind the sequence of inserting the shutter blades (view from camera bayonet).

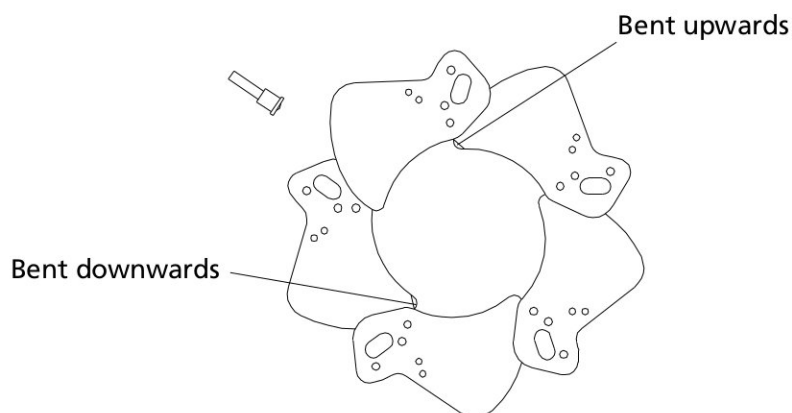


Fig. 01:3:09/2

## General

### Exchange of blade opening ring

- Remove spring for blade opening ring from the front.
- Remove blade opening ring.

### Exchange of diaphragm blades

- Remove control pawl spring and diaphragm spring.
- Open diaphragm fully.
- Unscrew screws of blade cover disc (3 standard screws, 1 special screw).
- Remove blade cover disc.
- Dismount diaphragm blades.

Assembly is carried out in the reverse sequence analogously.

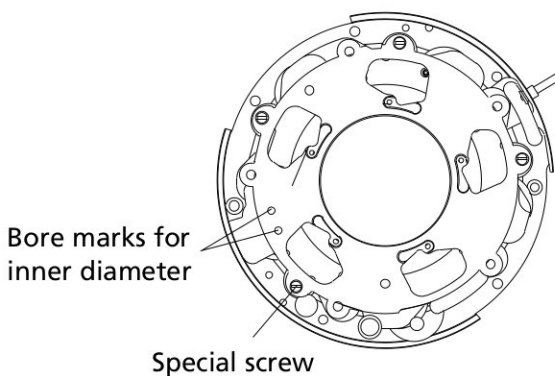


Fig. 01:3:10/1

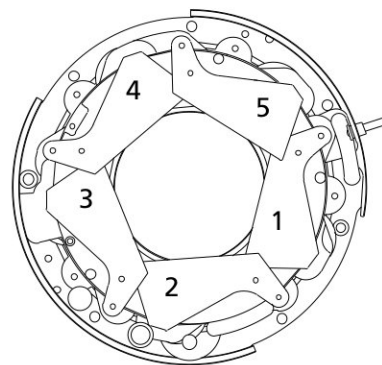


Fig. 01:3:10/2

- Insert centering pin (Tool No. 109950-0688-000, Former Tool No. 1450/8 387 176) through the case into the plastic bush of the cocking pinion when tightening the screws of the base plate.
- Test the function of the override latch at the control ring. The baffle plate spring (01:3:10/3-1) has to latch (01:3:10/3-2) when the blades extend into the opening diameter at least for approx. 0.2-0.3 mm.

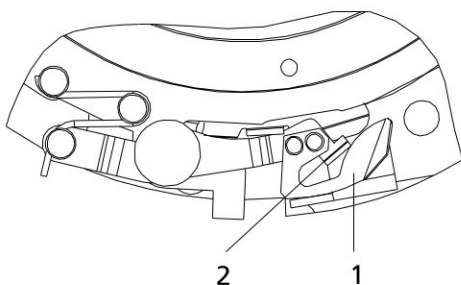


Fig. 01:3:10/3

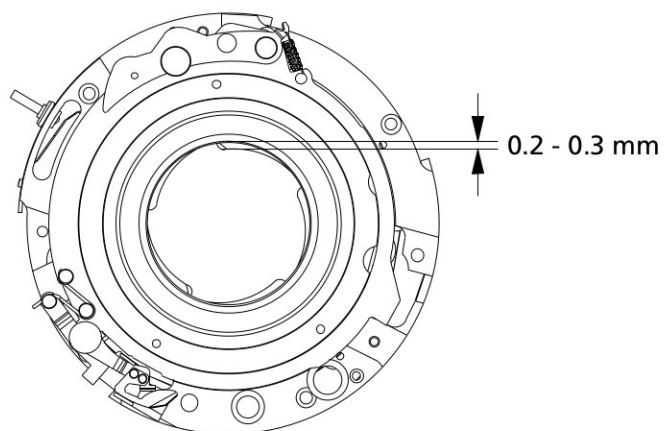


Fig. 01:3:10/4

### General

#### Exchange of base plate

- See "Exchange of blades and blade opening ring".
- Dismount driving spring 1 from the front.
- Dismount drive.
- Dismount bridge.
- Dismount driving spring 2.
- Open shutter by twisting the blade ring.
- Dismount retard gear train (2 screws).
- Dismount cocking pinion, intermediate cocking gear and spring for intermediate cocking gear.
- Dismount speed lever
- Dismount mount tube.
- Dismount closing spring for blade ring.
- Remove blade ring.

Assembly is carried out in the reverse sequence analogously.

Secure screws of mount tube and stop plate with two component adhesive.

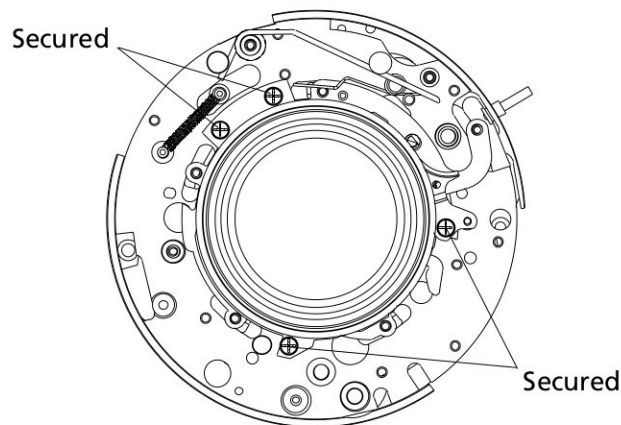


Fig. 01:3:11/1

## General

### Exchange of cocking shaft

Special tools:

V-2223

Standard gauge

109950-0721-000

Auxiliary ring

Assortment of 16 different cocking shafts 109950-0064-XXX (XXX = 000-160)

- Insert intermediate cocking gear (01:3:12/1-6) together with spring (01:3:12/1-3).
- Spring for intermediate cocking gear has to rest against the spring suspension rivet (01:3:12/1-1).
- Pre-cock intermediate cocking gear, until its boring (01:3:12/1-2) points to the center of the spring suspension rivet (01:3:12/1-1).
- Insert (anyone of assortment) cocking shaft (01:3:12/1-4) in a way, that the index (01:3:12/1-5) points to the center of intermediate cocking gear (**clearance for one of the shutter blades**).
- Tension the shutter slowly by the gauge lever and make sure the cocking shaft starts to rotate before position No. 11 marked out on tool V-2223.
- In case the cocking shaft starts to rotate later than No. 11, select another shaft out of the assortment.

(see: "Recommendation: Mark position of cocking shaft.")

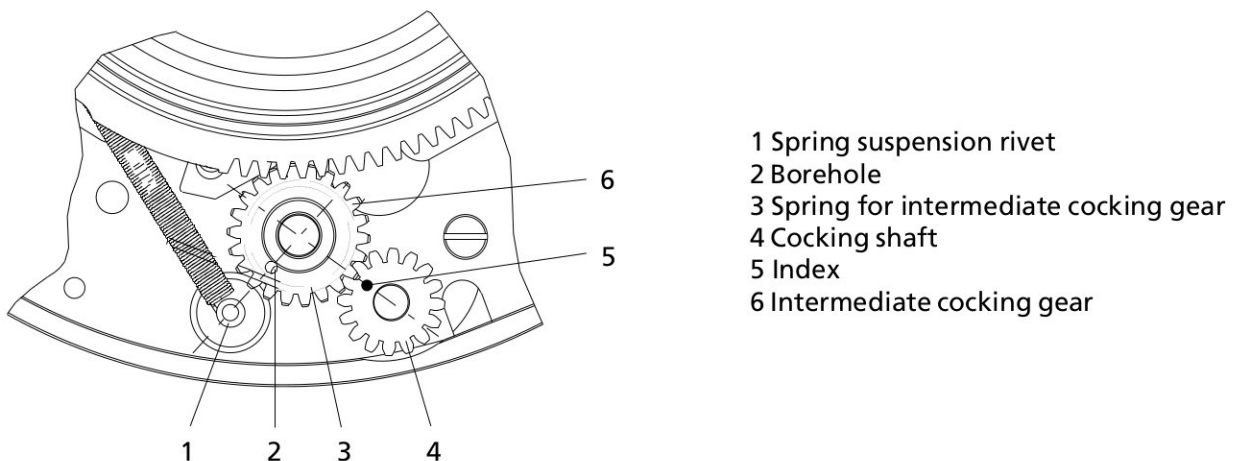


Fig. 01:3:12/1

## General

### Exchange of drive spring 1

It is recommended to change the drive spring 1 doing repair works on the shutter unit. Lubricate well inside diameter of drive spring with Lubricant K. Hang in short leg at Pos. 01:3:13/1-1.

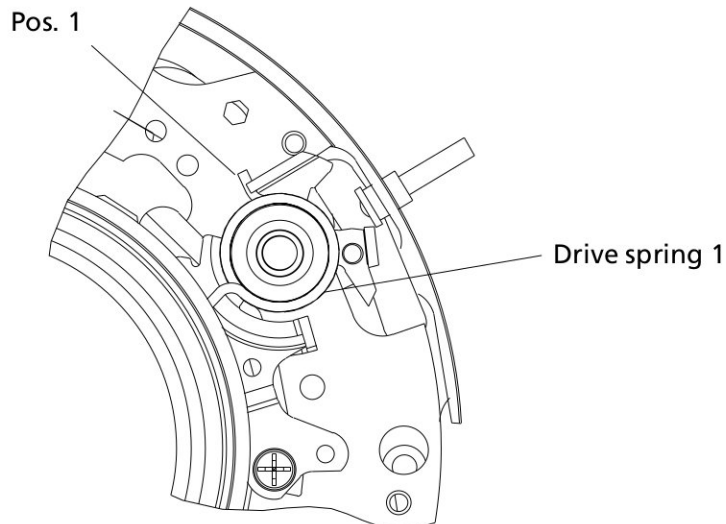


Fig. 01:3:13/1

### Exchange of bridge

Special Tools:

109950-0721-000 Auxiliary ring

109950-0715-000 Locking lever adjuster

- When mounting the bridge (01:3:13/2-1), make sure that the nose (01:3:13/2-3) of the locking lever (01:3:13/2-2) suspended by the cocking ring (01:3:13/2-5) will fall it at the drive (01:3:13/2-4) by at least 0.5 mm.
- In case of deviation: Bend locking lever (01:3:13/2-2) as required for the right engaging depth with the locking lever adjustment tool (A = Point of application for the locking lever adjuster).

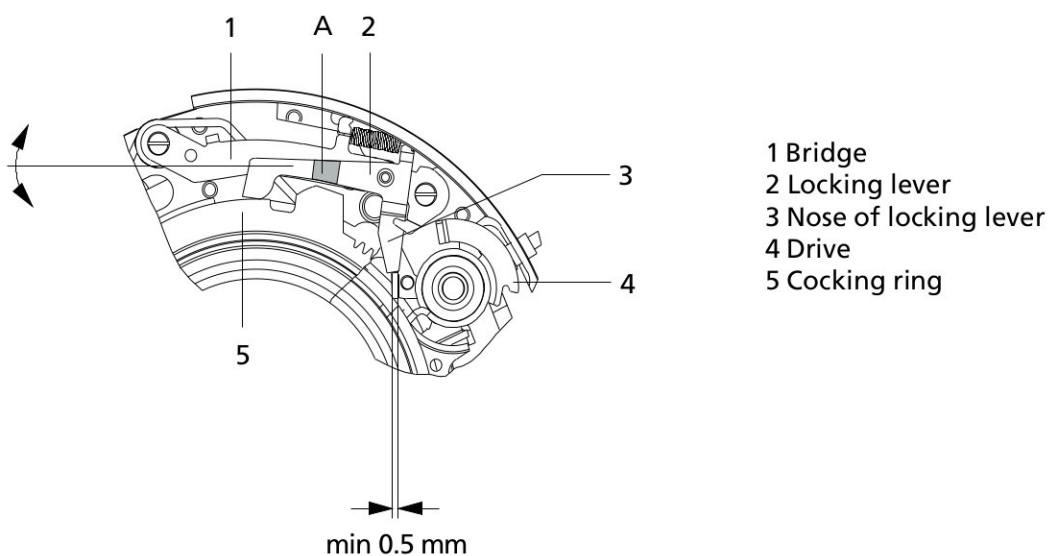


Fig. 01:3:13/2

### General

#### Checking of flash contact

- In released position the opening width of contact must be 0.5 mm.
- The contact must close approx. 1 mm before the shutter is fully opened.

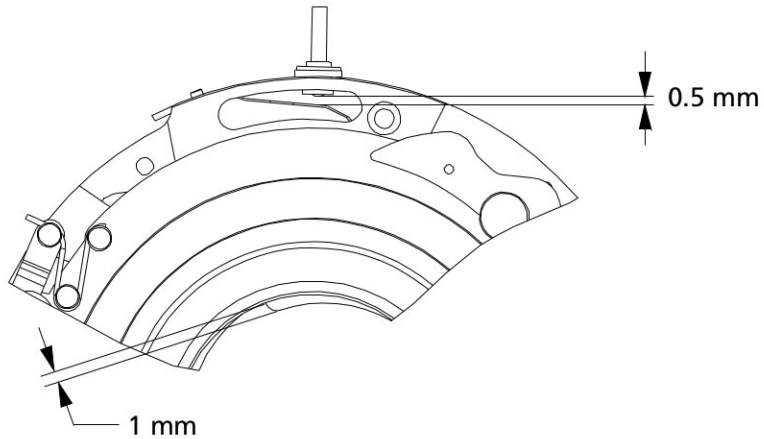


Fig. 01:3:14/1

## General

### Exchange of the retard gear train

#### Special Tools:

109950-0726-000 Retard lever pin bending tool

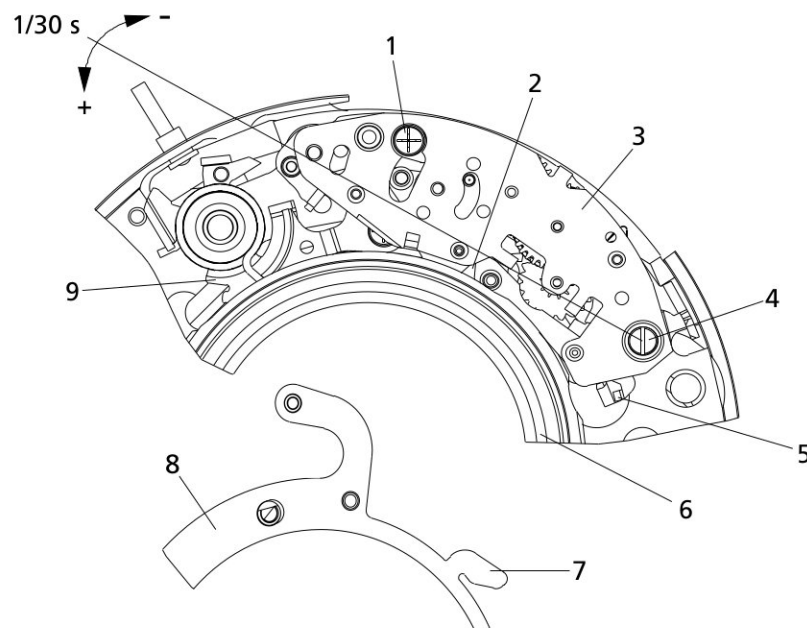
109950-0725-000 Retard lever pin bending tool

109950-0718-000 Control pawl and retard gear train bending tool

- Turn the blade ring (01:3:15/1-8) at the switch off hook for escapement 2 (01:3:15/1-2) towards the drive (01:3:15/1-9).
- Fit in retard gear train (01:3:15/1-3), press slightly towards the center against the tube mount (01:3:15/1-6) and screw tight.
- Adjust control fin (01:3:15/1-5) of the escapement lever 2 in a way that the escapement 2 (01:3:15/1-2) touches the tube mount (01:3:15/1-6) when it is switched off.
- Fit the cam ring (must be fitted before the speeds can be checked).
- Check 1/30 s. In case of deviation: Loosen both screws (01:3:15/1-1) (01:3:15/1-4) and revolve the retard gear train around screw (01:3:15/1-4).

Towards tube mount	=	prolongation of time
Away from tube mount	=	shortening of time

- After adjustment, tighten both screws firmly.



- 1 Screw
- 2 Escapement 2
- 3 Retard gear train
- 4 Screw (Revolving point)
- 5 Control fin for escapement 2
- 6 tube mount
- 7 Switch off hook
- 8 Blade ring
- 9 Drive

Fig. 01:3:15/1

## General

- Check 1/125 s. The control fin (01:3:16/1-3) must rest against the center side of the control cam. In case of deviation: Adjust speed by bending the adjusting pin (01:3:16/1-1).

Towards tube mount = shortening of time  
 Away from tube mount = prolongation of time

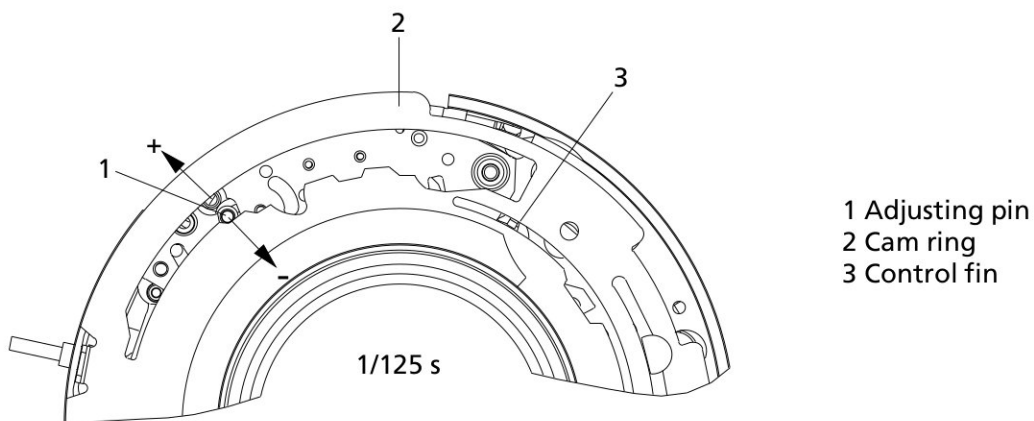


Fig. 01:3:16/1

- Check 1/500 s. In case of deviation: Bend retard lever pin (01:3:16/2-1) to such a degree, that the retard lever is disengaged by the cam ring (01:3:16/2-2) and the drive can work without resistance.

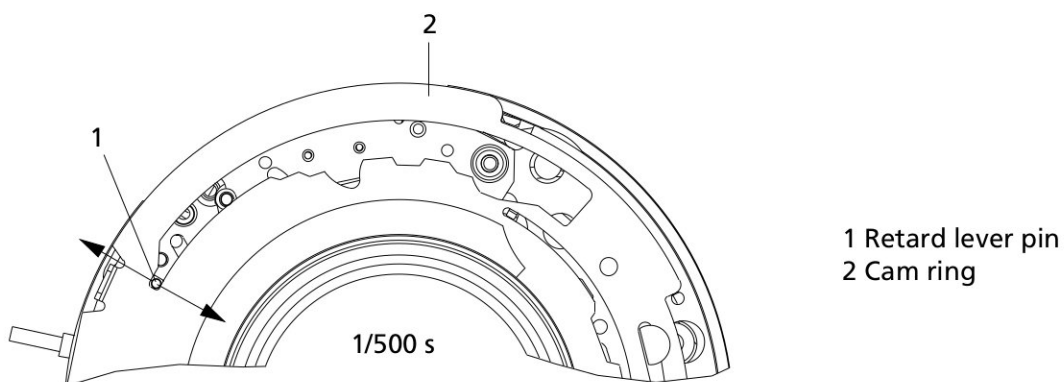


Fig. 01:3:16/2

## General

- Check 1 s. In case of deviation: Bend tongue (01:3:17/1-1) for escapement 1 (01:3:17/1-2) as far as required.
- Mind catch of escapement (01:3:17/2).

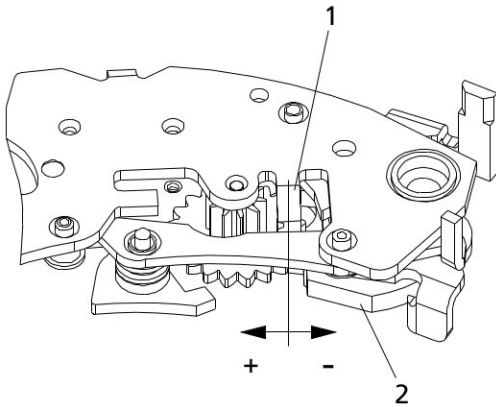


Fig 01:3:17/1

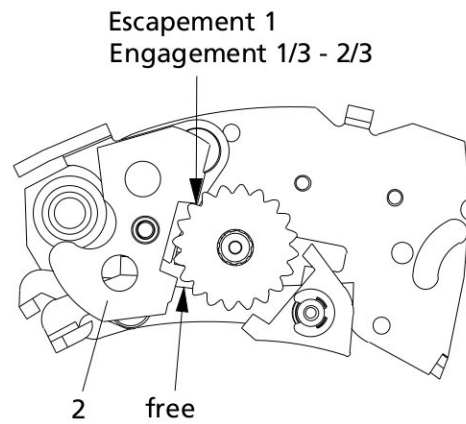


Fig. 01:3:17/2

- Check 1/8 s and 1/15 s formed by escapement 2. In case of deviation: Bend tongue (01:3:17/3-1) for escapement 2 (01:3:17/3-2) as far as required.
- Mind catch of escapement (01:3:17/4).

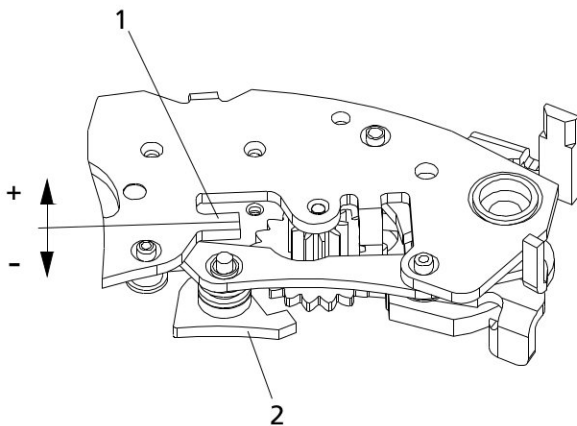


Fig. 01:3:17/3

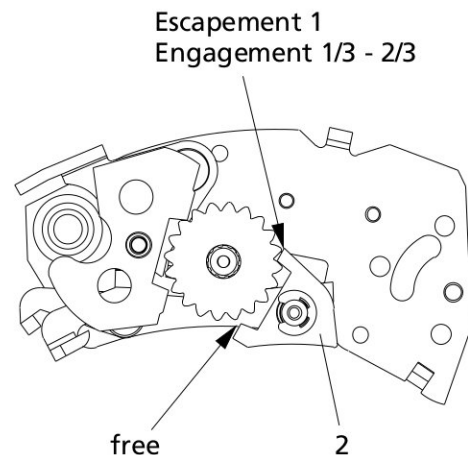


Fig. 01:3:17/4

- Check remaining shutter speeds, if necessary adjust values by chiseling or filing the control cam.

## General

### Shutter speed table

Nominal speed	s	1	1/2	1/4	1/8	1/15	1/30	1/60	1/125	1/250	1/500
Upper limit DIN 19015	ms	1231	616	308	154	76.9	38.5	19.24	9.62	5.34	2.67
Upper limit Carl Zeiss	ms	1149	574	287	144	71.8	35.9	17.95	8.97	4.68	2.34
<b>Nominal speed</b>	<b>ms</b>	<b>1000</b>	<b>500</b>	<b>250</b>	<b>125</b>	<b>62.5</b>	<b>31.3</b>	<b>15.63</b>	<b>7.81</b>	<b>3.91</b>	<b>1.95</b>
Lower limit Carl Zeiss	ms	871	435	218	109	54.4	27.2	13.6	6.8	3.26	1.63
Lower limit DIN 19015	ms	812	406	203	102	50.8	25.4	12.69	6.35	2.86	1.43
Tolerance Carl Zeiss	EV	±0.2								±0.26	
Tolerance DIN 19015	EV	±0.3								±0.45	

## Additional instructions for CFE and CFi type lenses

The shutter blades and the diaphragm blades are opened when the shutter is cocked and the setting ring is in "F-position". As long as the release knob of the camera is pressed the diaphragm blades stay closed at the preset position.

### F-adjustment

Special Tools:  
109950-0750-000 Auxiliary cam

**Note! The shutter must be separated from the barrel.**

- Mount auxiliary cam.
- Using shutter speed setting from 1/500s to B, the diaphragm will remain closed after operating sequence.
- Using the F-setting, the diaphragm opens fully after operating sequence.
- Turn cocking ring (01:3:19/1-1) until rivet (01:3:19/1-4), on control lever (01:3:19/1-2) comes to be positioned just before the peak point of the cam.
- In this position, control latch (01:3:19/1-5) must fall in at the control lever by 0.5 mm and arrest it.
- If necessary, correct by bending fin (01:3:19/1-3).

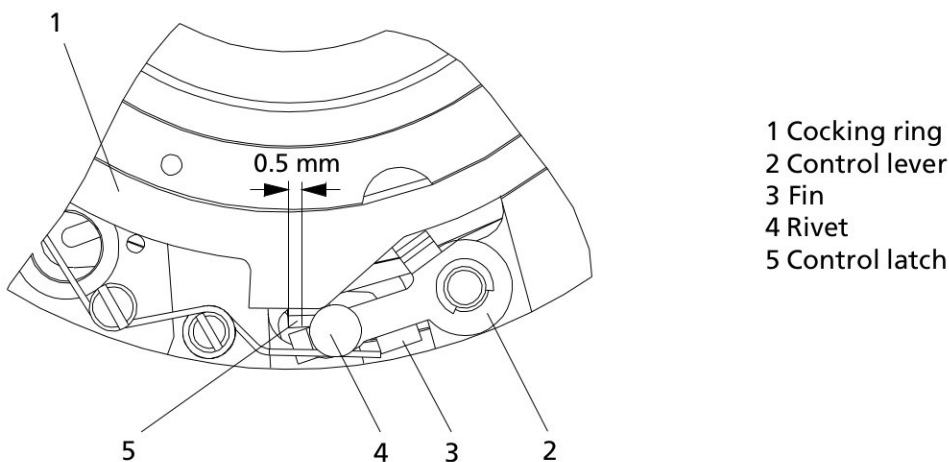


Fig. 01:3:19/1

### Additional instructions for CFE and CFi type lenses

#### Adjustment of diaphragm switch lever

##### Special Tools:

V-2223 Standard gauge

109950-0718-000 Control pawl and retard gear train bending tool

109950-0750-000 Auxiliary cam

- Select B-position.
- Mount auxiliary cam
- Check shutter with standard gauge.
- Check that there is a clearance of 0.1 – 0.2 mm between the diaphragm switch lever (01:3:20/1-2) and the cocking ring (01:3:20/1-1).  
(A = Point of application for the control pawl and retard gear train bending tool).

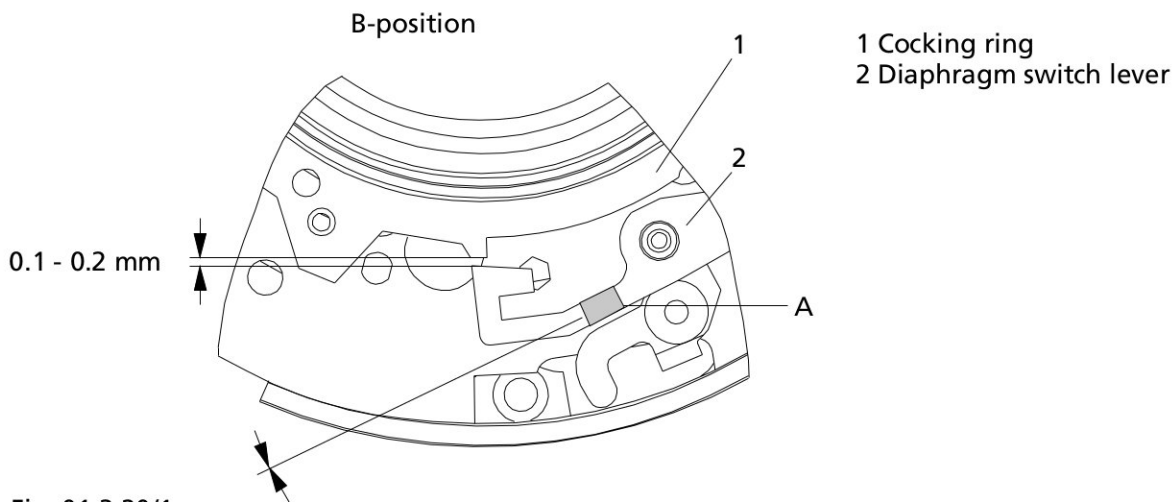


Fig. 01:3:20/1

## Additional instructions for CFE and CFi type lenses

### Special Tools:

V-2223                      Standard gauge

109950-0718-000 Control pawl and retard gear train bending tool

109950-0719-000 Control lever latch bending tool

- Select F-position.
- Mount auxiliary cam.
- Adjust diaphragm switch lever (01:3:21/1-2) with the control pawl and retard gear train bending tool in a way that its nose does not touch the cocking ring (01:3:21/1-1).  
(A = Point of application for the control pawl and retard gear train bending tool)
- Make sure the diaphragm opens up within position No. 5 marked out on gauge V-2223. Adjust if necessary.  
(B = Point of application for the control lever latch bending tool)

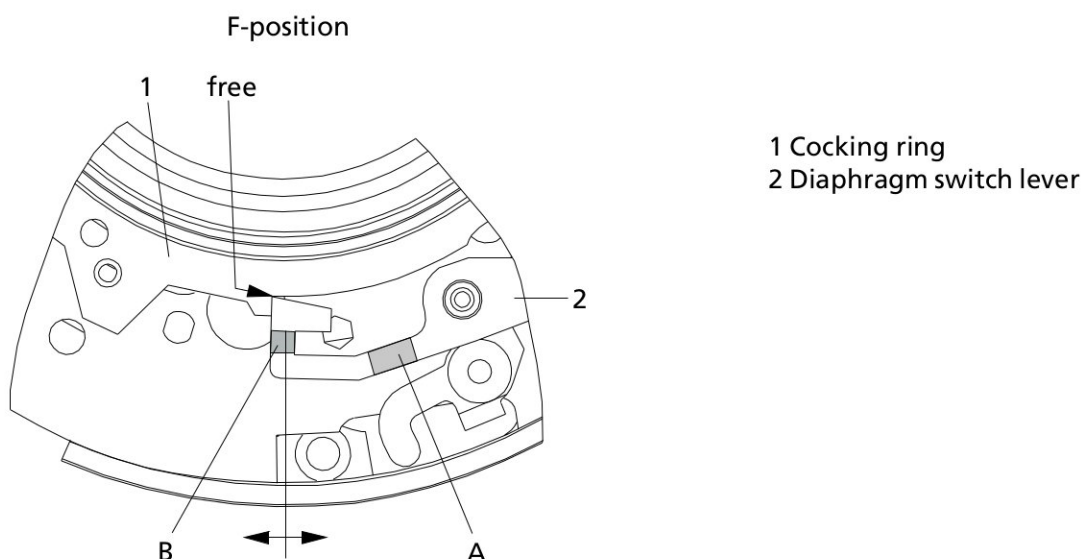


Fig. 01:3:21/1

### Additional instructions for CFE type lenses

[Link to: VHABSTS](#)

#### Adjustment of circuit board position for F-stop indication

- Mount the lens on a camera body 202, 203 or 205.
- Make sure that the preset F-stop value corresponds (lens/camera body).
- If not, loosen the 3 screws (01:3:22/1-1) and reset the printed circuit board (01:3:22/1-2) accordingly.
- Tighten the screws and recheck.
- Repeat until F-stop setting and camera display corresponds.

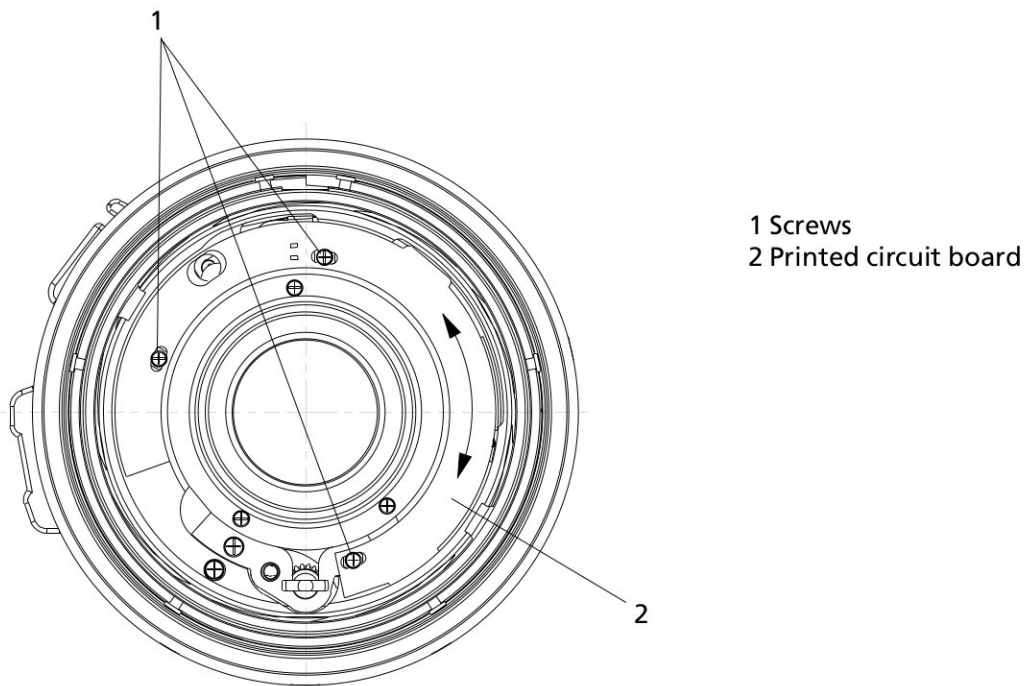


Fig. 01:3:22/1

## Mounting and dismounting of focusing mount

### Focusing mount 102211-8574-000

Used for the following types:

Planar	2,8/80
Distagon	4/40
Distagon	4/50
Distagon	3,5/60

**Note!** The threaded ring and the flange can be put together in any position.

Make sure that the measurement  $4.5 \pm 0.2$  mm is achieved by rotating the focusing mount parts (01:3:23/1-1) against each other.

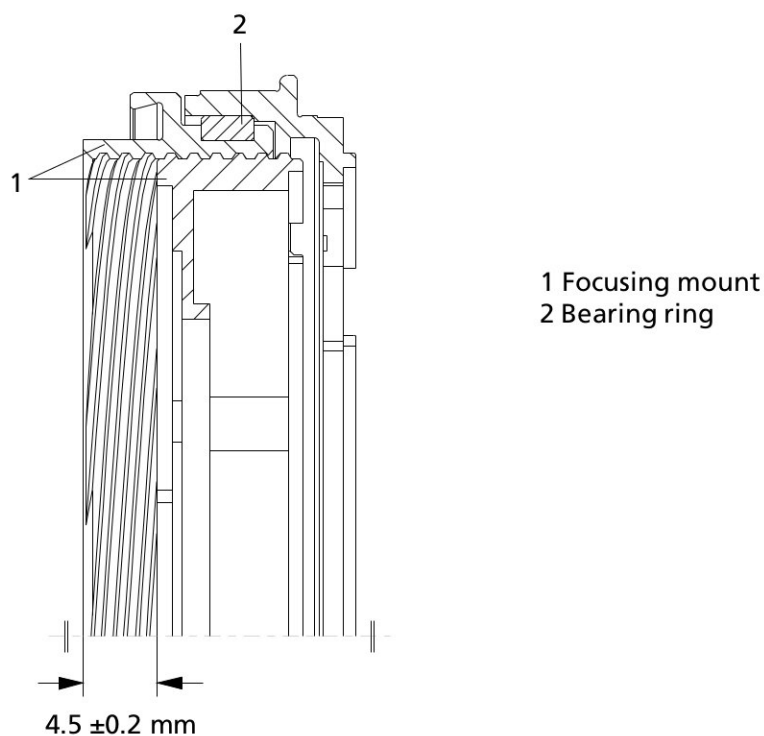


Fig. 01:3:23/1

### General

Lubricants other than those given in the lubrication chart must not be used, for only the ones tested by us can guarantee safe operation.

Grease points of lubrication only slightly.

Shining grey gears have been lubricated in a special procedure already when being manufactured and therefore never require any further lubrication.

Lubricant	Order No.
Lubricant K	HB-K
Lubricant L	HB-L
Lubricant M	HB-M
Lubricant N	HB-N
Lubricant P	HB-P
Lubricant R	HB-R
Lubricant S	HB-S
Lubricant T	HB-T
Lubricant Y	HB-Y

## General

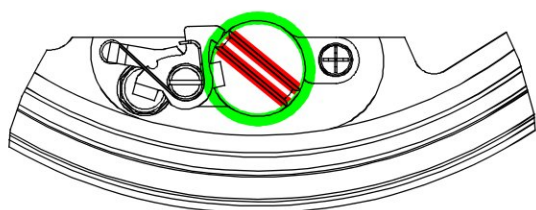


Fig. 01:4:02/1

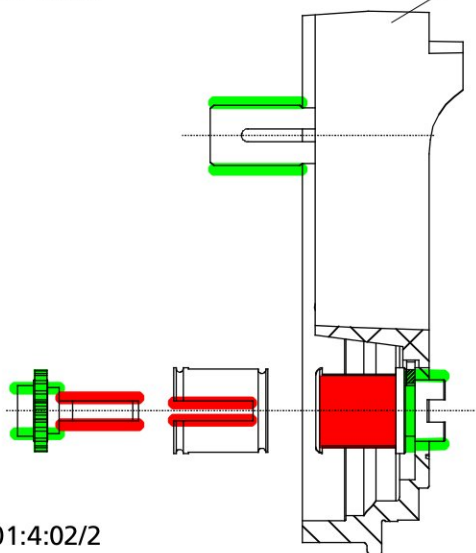


Fig. 01:4:02/2

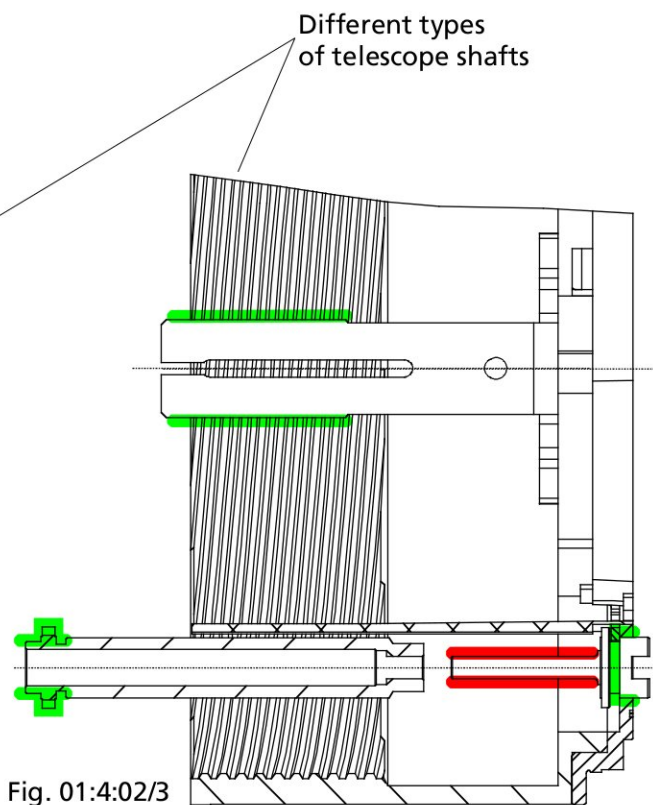


Fig. 01:4:02/3

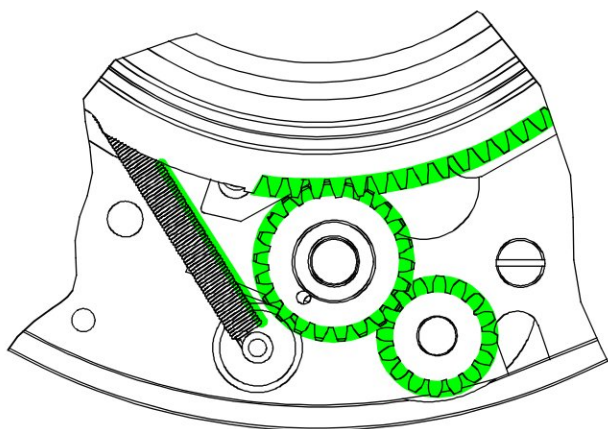


Fig. 01:4:02/4

HB - K  
HB - L

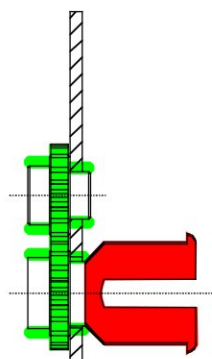


Fig. 01:4:02/5

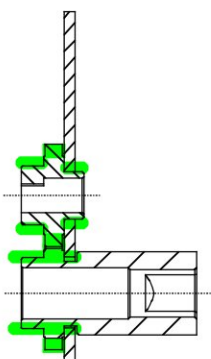


Fig. 01:4:02/6

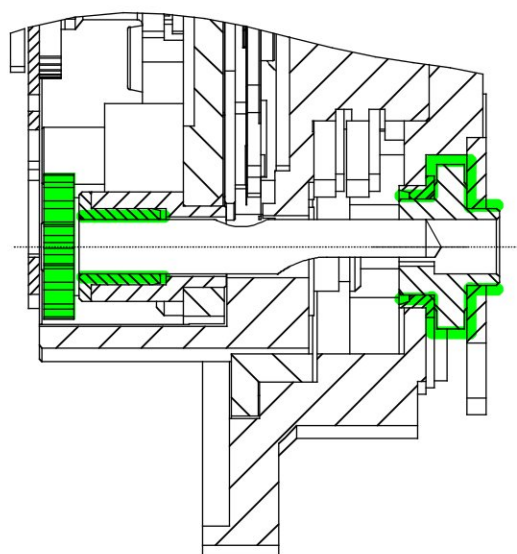


Fig. 01:4:02/7

## General

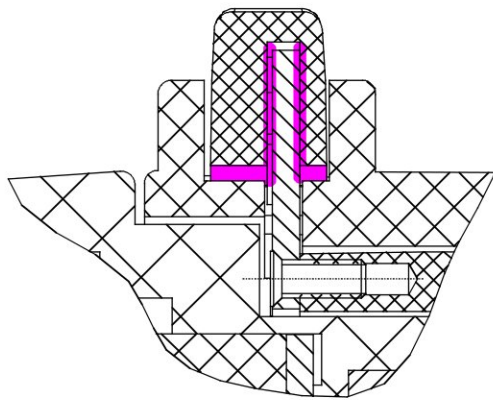


Fig. 01:4:03/1

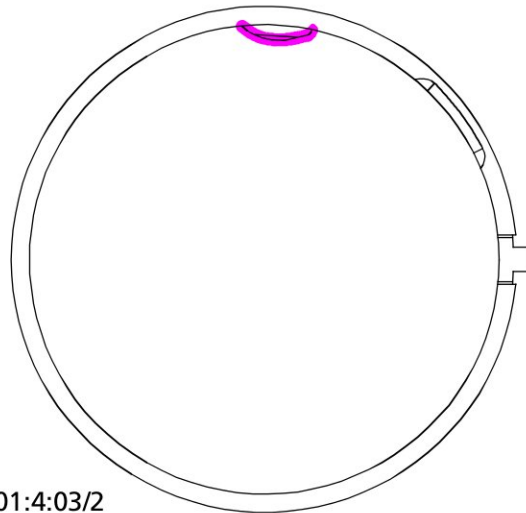


Fig. 01:4:03/2

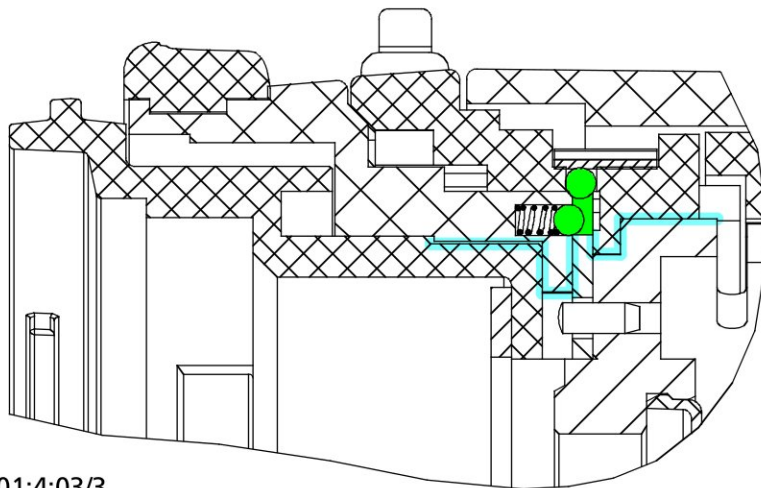


Fig. 01:4:03/3

- HB - K
- HB - N
- HB - S

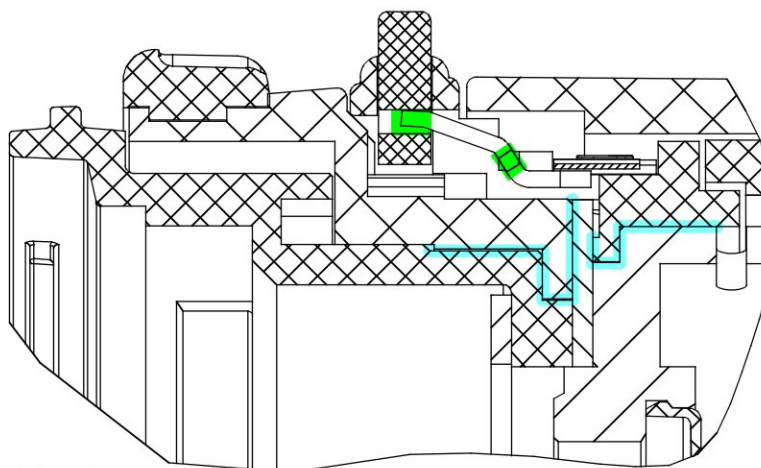


Fig. 01:4:03/4

## General

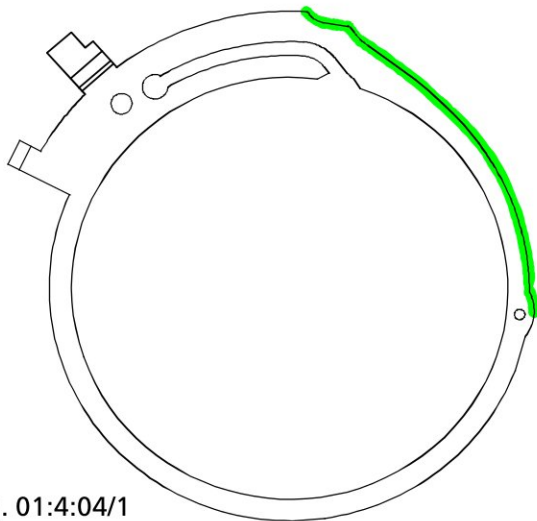


Fig. 01:4:04/1

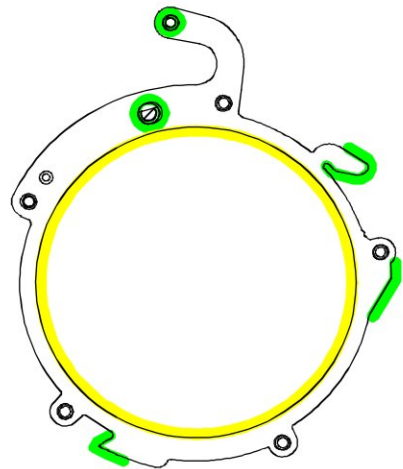


Fig. 01:4:04/2

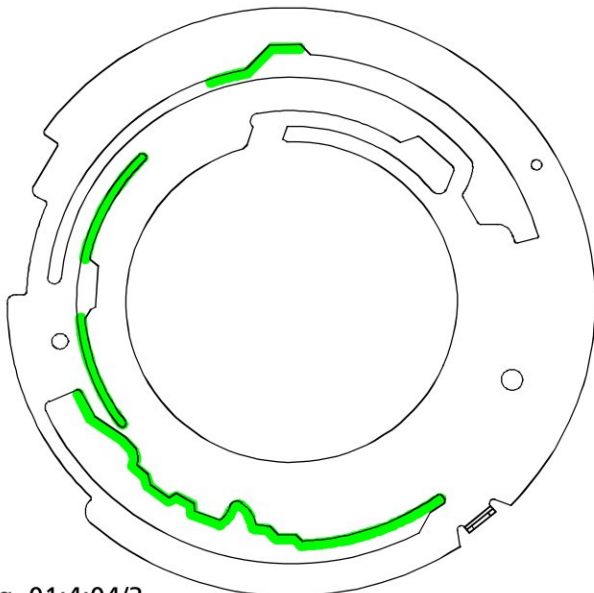


Fig. 01:4:04/3

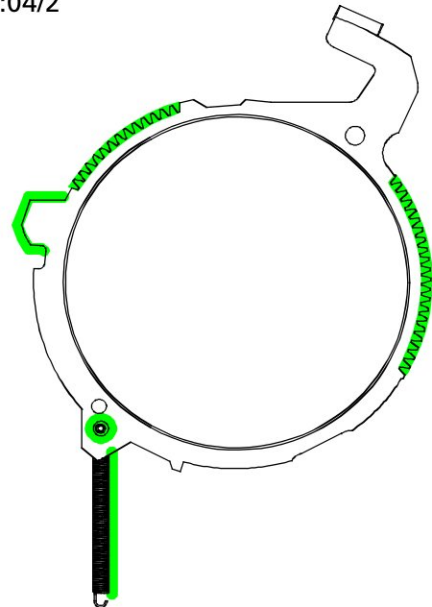


Fig. 01:4:04/4

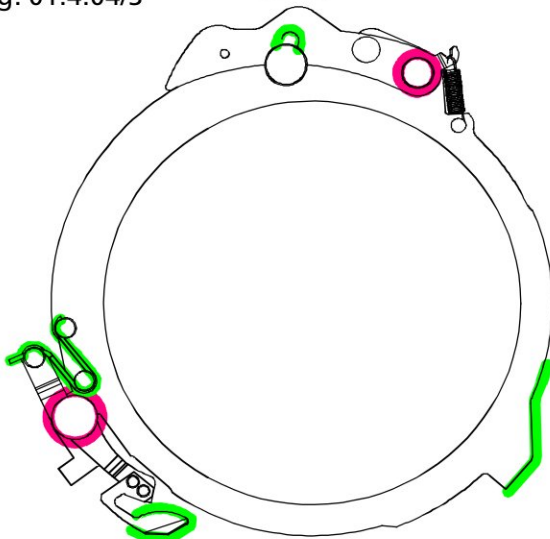


Fig. 01:4:04/5

- HB - K
- HB - M
- HB - Y

## General

HB - K  
 HB - M

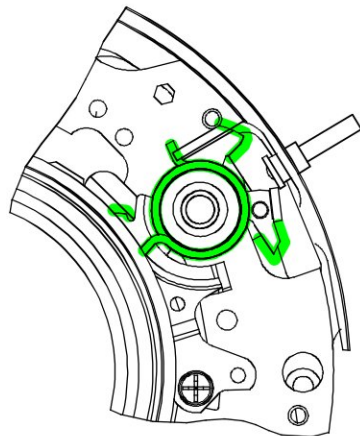


Fig. 01:4:05/1

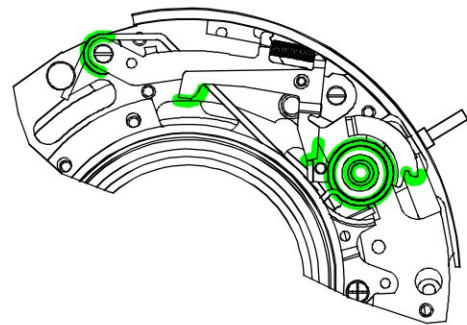


Fig. 01:4:05/2

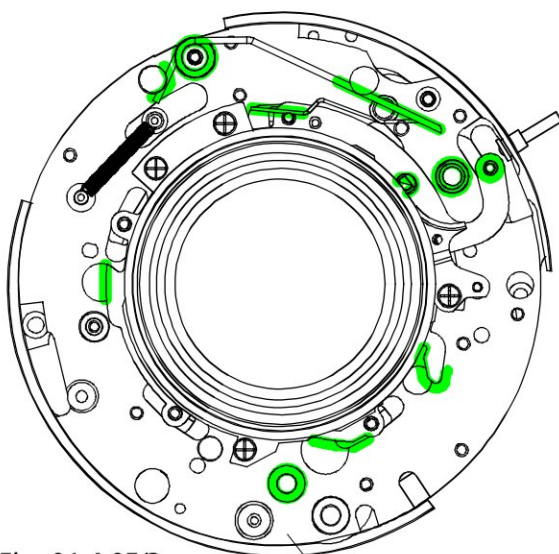


Fig. 01:4:05/3

CB lenses

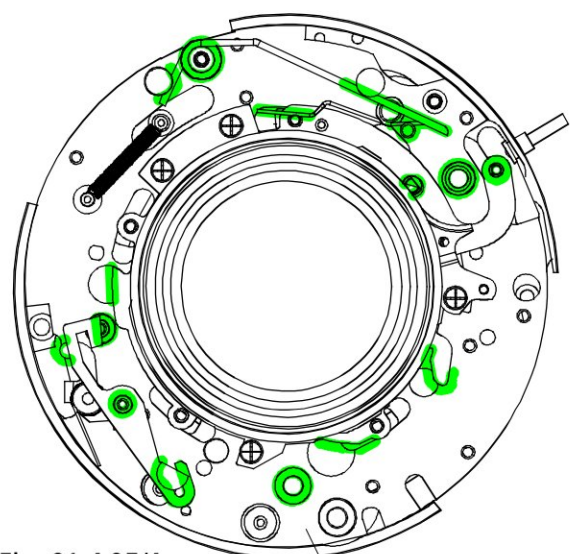


Fig. 01:4:05/4

CFE/CFi lenses

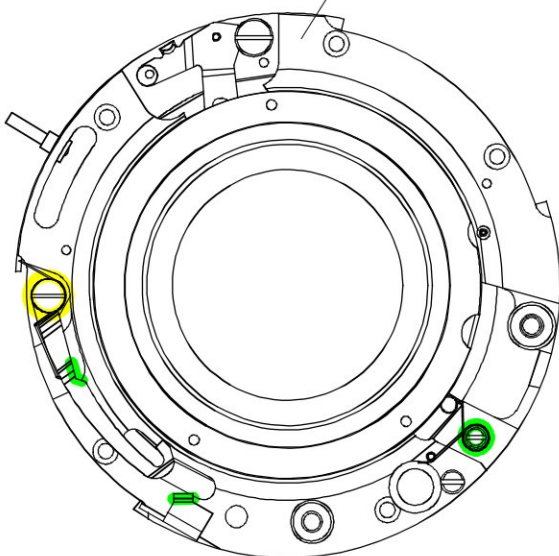


Fig. 01:4:05/5

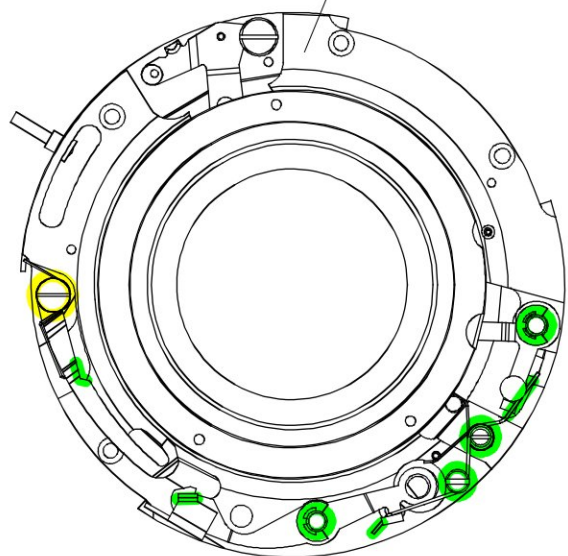


Fig. 01:4:05/6

## General

focal length 30

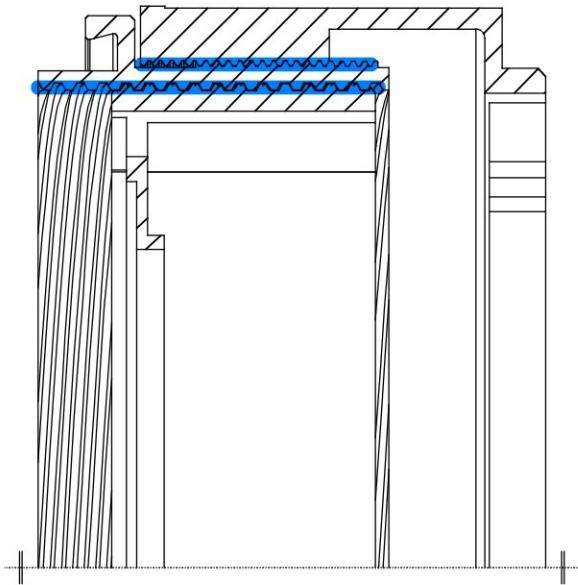


Fig. 01:4:06/1

focal lengths 40, 50, 60

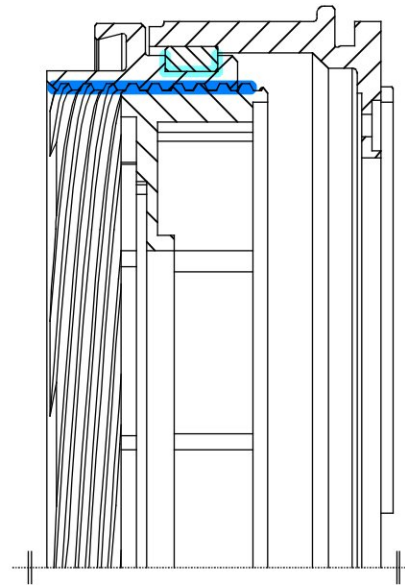


Fig. 01:4:06/2

focal length 80

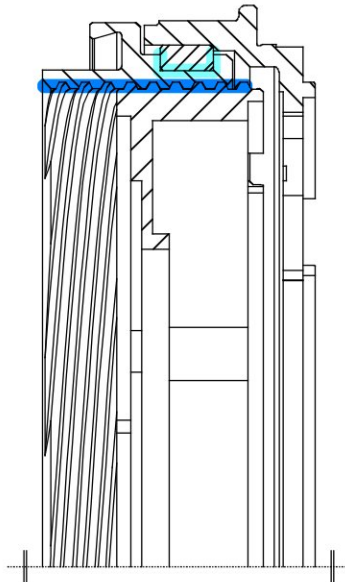


Fig. 01:4:06/3

focal length 100

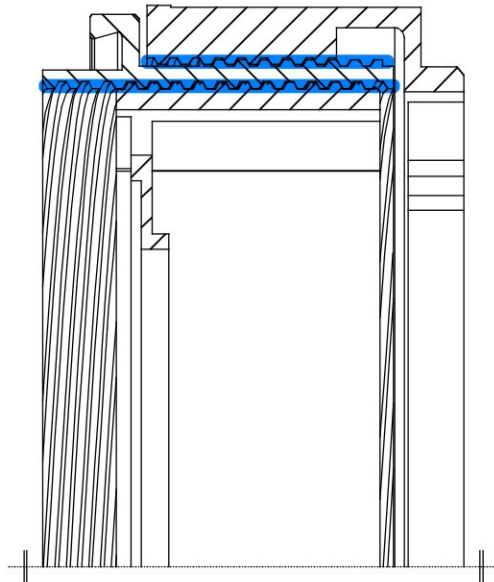


Fig. 01:4:06/4

HB - S  
HB - T

## General

focal lengths 120, 180

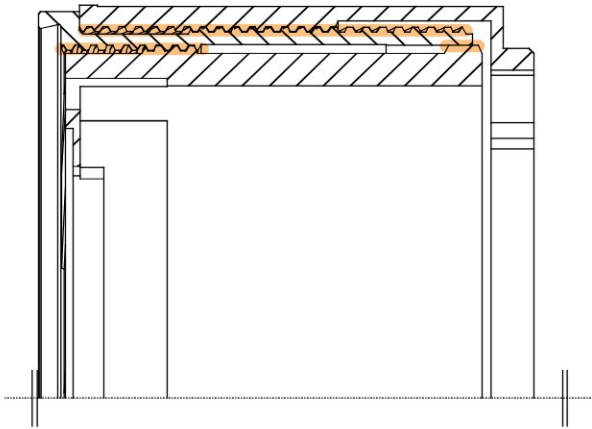


Fig. 01:4:07/1

focal length 150

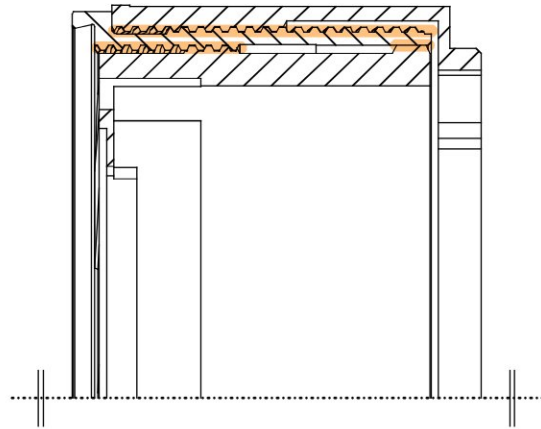


Fig. 01:4:07/2

focal length 160

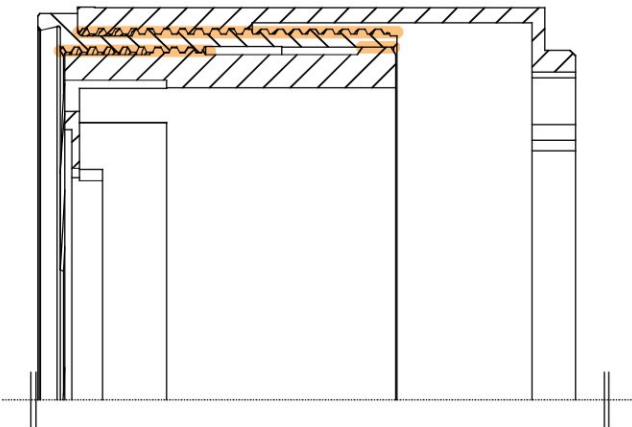


Fig. 01:4:07/3

HB - R

focal length 250

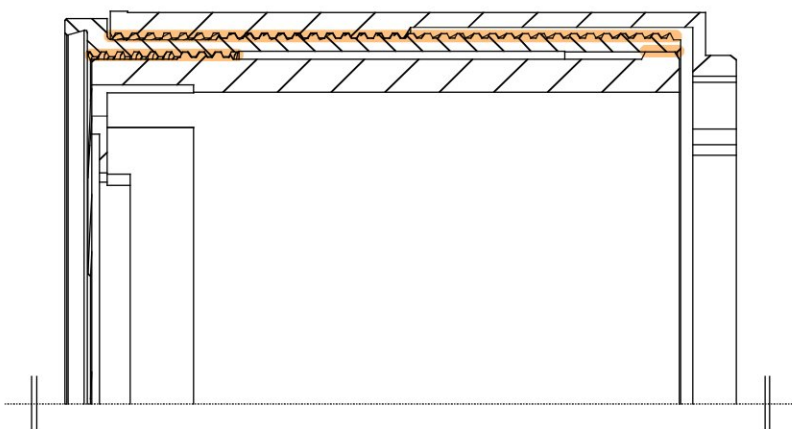
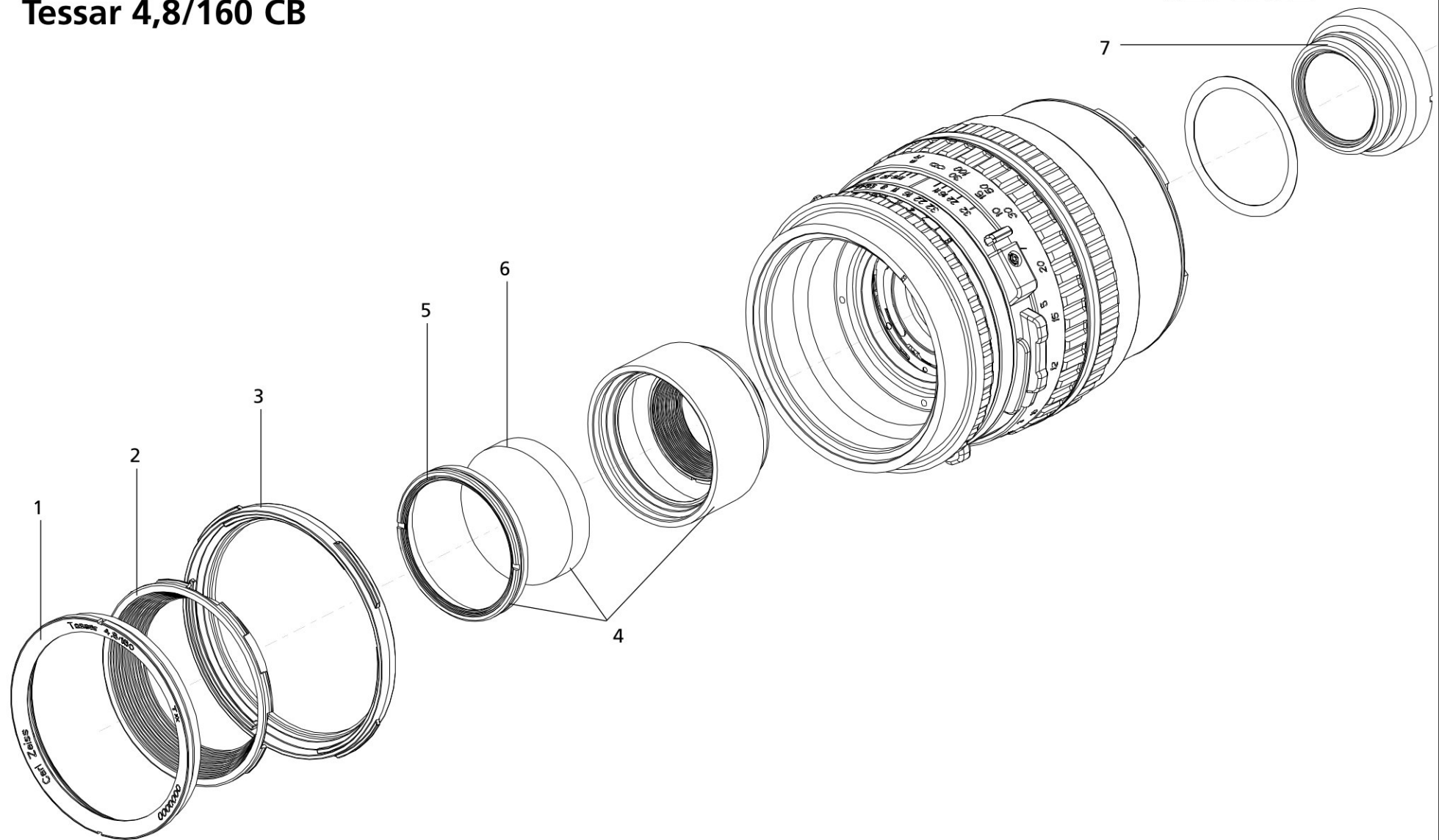


Fig. 01:4:07/4

Pos No.	Pcs	Spare Part No.	Description	Remark
1	1	102165-0011-160	Engraved ring	
2	1	102165-0012-040	Snap ring	
3	1	102165-1010-000	Bayonet	
4	1	100349-8105-000	Front lens element	
5	1	100349-0111-000	Lens holding ring	
6	1	100349-0001-010	Front lens	
7	1	100349-8106-000	Rear lens Element	

02:1:02

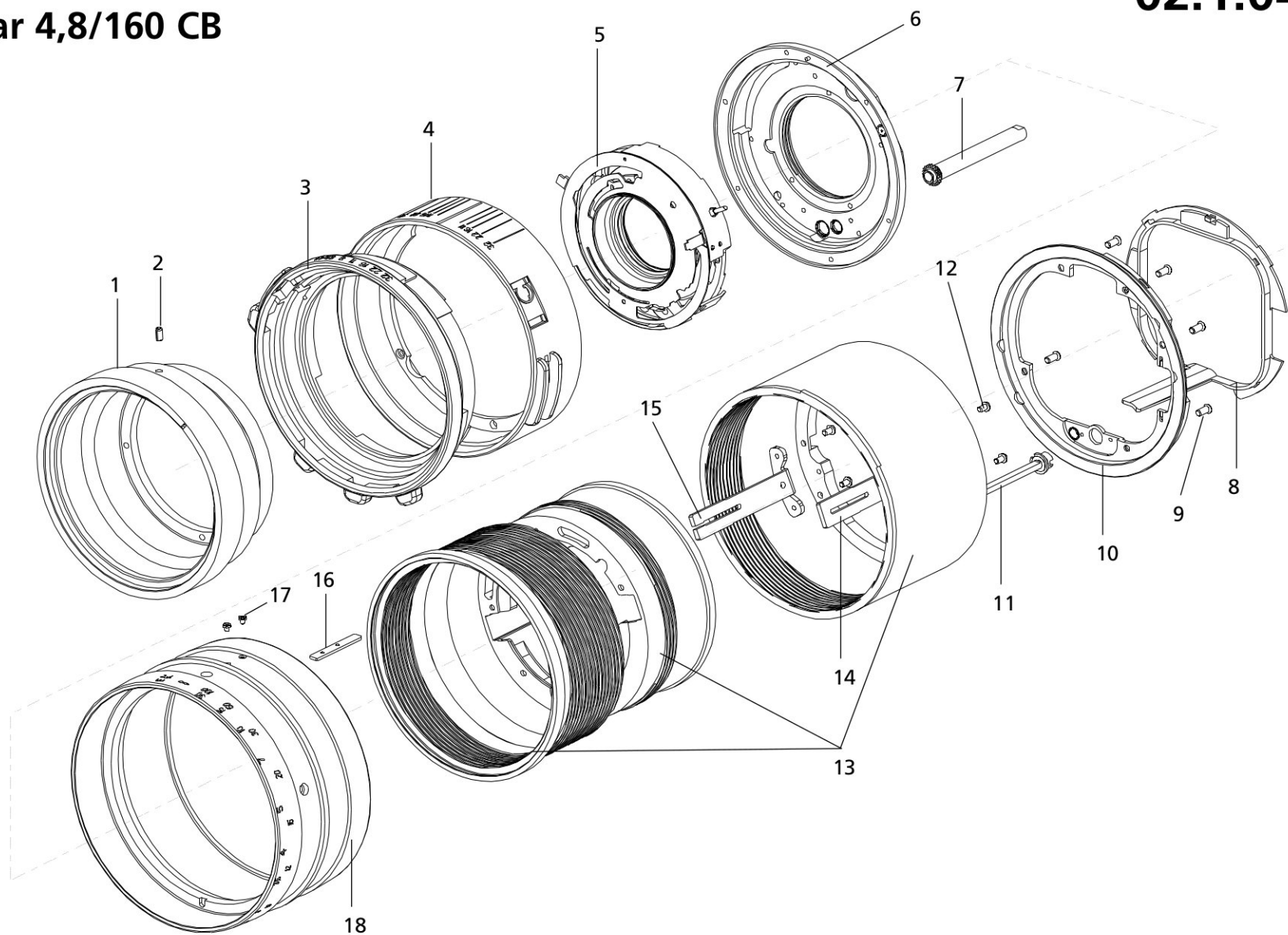
# Tessar 4,8/160 CB



Pos No.	Pcs	Spare Part No.	Description	Remark
1	1	100349-8058-000	Holding ring	
2	1	000000-0095-550	Roll pin	
3	1	100349-1590-010	Diaphragm clutch ring	
4	1	100349-1744-010	Depth of field ring	
5	1	100349-8601-000	Shutter unit	
6	1	000000-1033-343	Shutter mount + case	
7	1	109950-0592-000	Telescope bush	
8	1	100349-1072-000	Light tunnel	
9	5	000000-0069-974	Screw	
10	1	000000-1015-939	Bayonet plate	
11	1	109950-0644-000	Telescope shaft	
12	4	000000-0093-535	Screw	
13	1	000000-1015-953	Focusing mount	
14	1	000000-1015-960	Guide bar	
15	1	000000-1015-961	Guide bar	
16	1	000000-1015-942	Stop	
17	2	000000-0098-795	Screw M1,7x1,5	
18	1	000000-1015-947	Focusing ring	

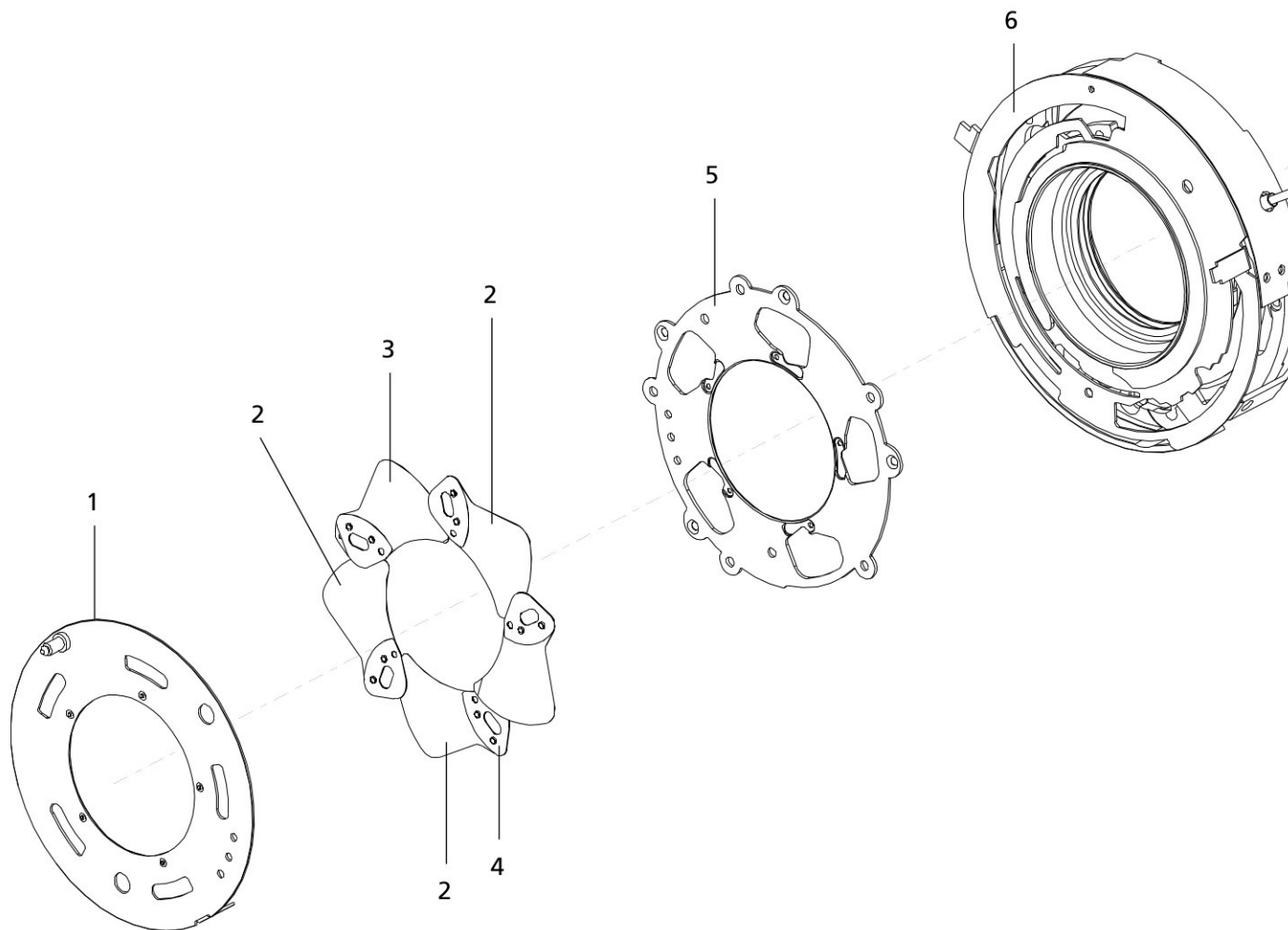
02:1:04

# Tessar 4,8/160 CB



Pos No.	Pcs	Spare Part No.	Description	Remark
1	1	109950-0417-000	Blade Opening Ring	
2	3	109950-0034-000	Blade	
3	1	109950-0755-000	Blade	
4	1	109950-0128-000	Blade	
5	1	109950-0416-000	Blade Cover Disc	
6	1	100349-8601-000	Shutter Unit	

## Tessar 4,8/160 CB



**Carl Zeiss**

**Tessar 4,8/160 CB**

**02:2:01**

Pos No.	Pcs	Tool No.	Former Tool No.	Description	Remark
1	1	102212-8105-901	-	Wrench for front element	
2	1	102212-8106-901	-	Wrench for rear element	

### Tessar 4,8/160 CB

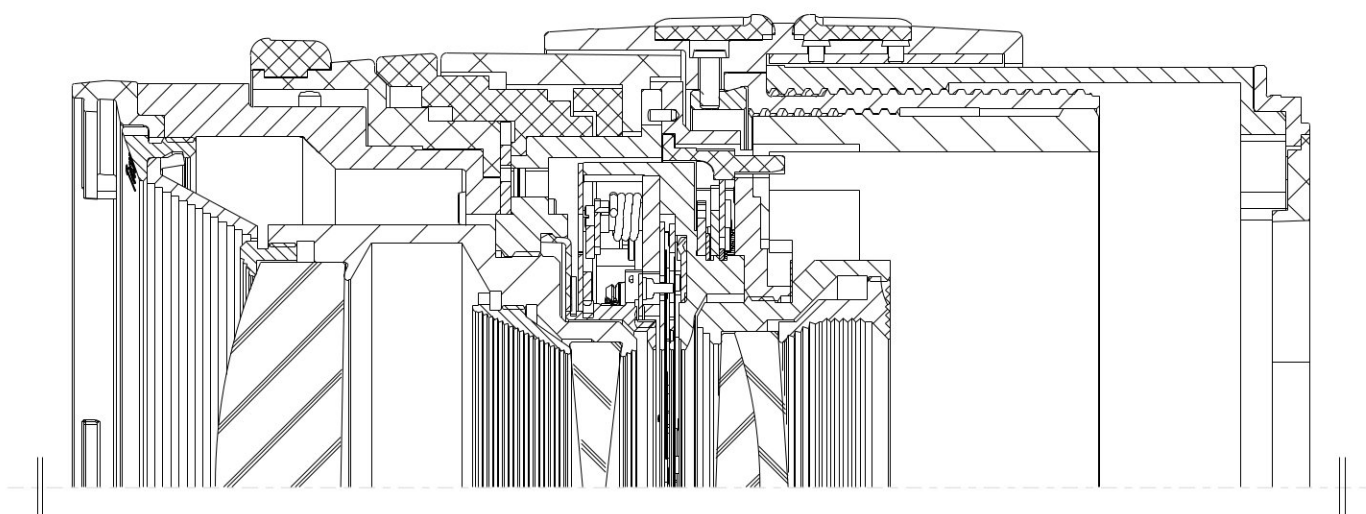


Fig. 02:3:01/1

## Mounting and dismounting of focusing mount

**Recommendation:** Before dismounting the focusing mount mark the positions between the three parts.

**Focusing mount 000000-1015-953**

Used for the following type: Tessar 4,8/160

- Screw together threaded ring (02:3:02/2-1) and flange (02:3:02/2-2) until face (Pos. B) is even.
- Fit in both parts into the carrier (02:3:02/2-3) according to 02:3:02/1 and screw in until the end.
- Mount one guide bar (turn the carrier to fit in the threads) and measure dimension A.
- In case of deviation: Dismount guide bar, unscrew threaded ring and flange and screw them into the next thread.

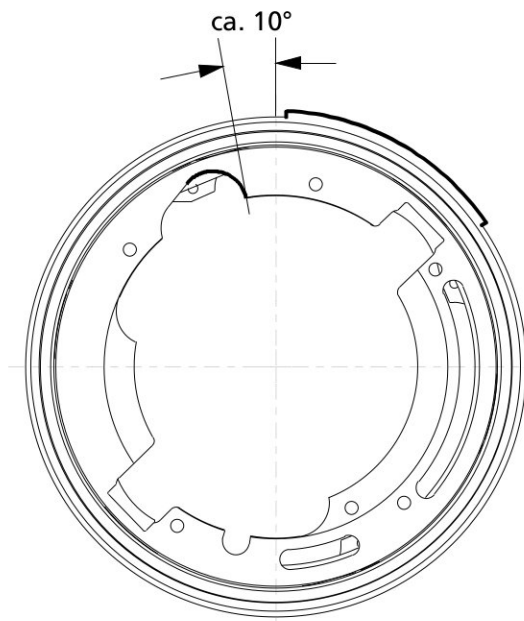


Fig. 02:3:02/1

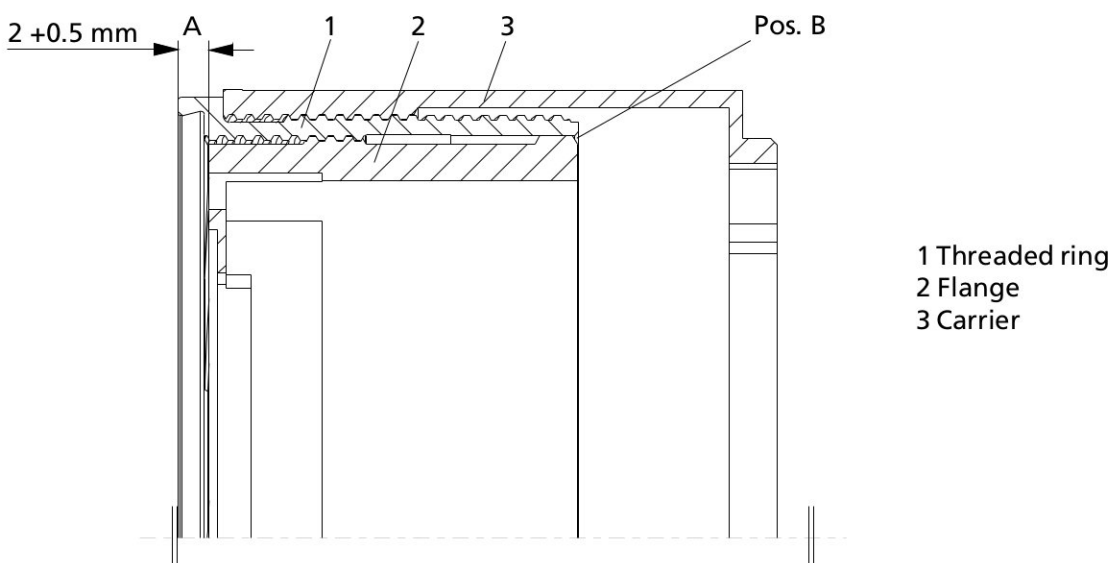
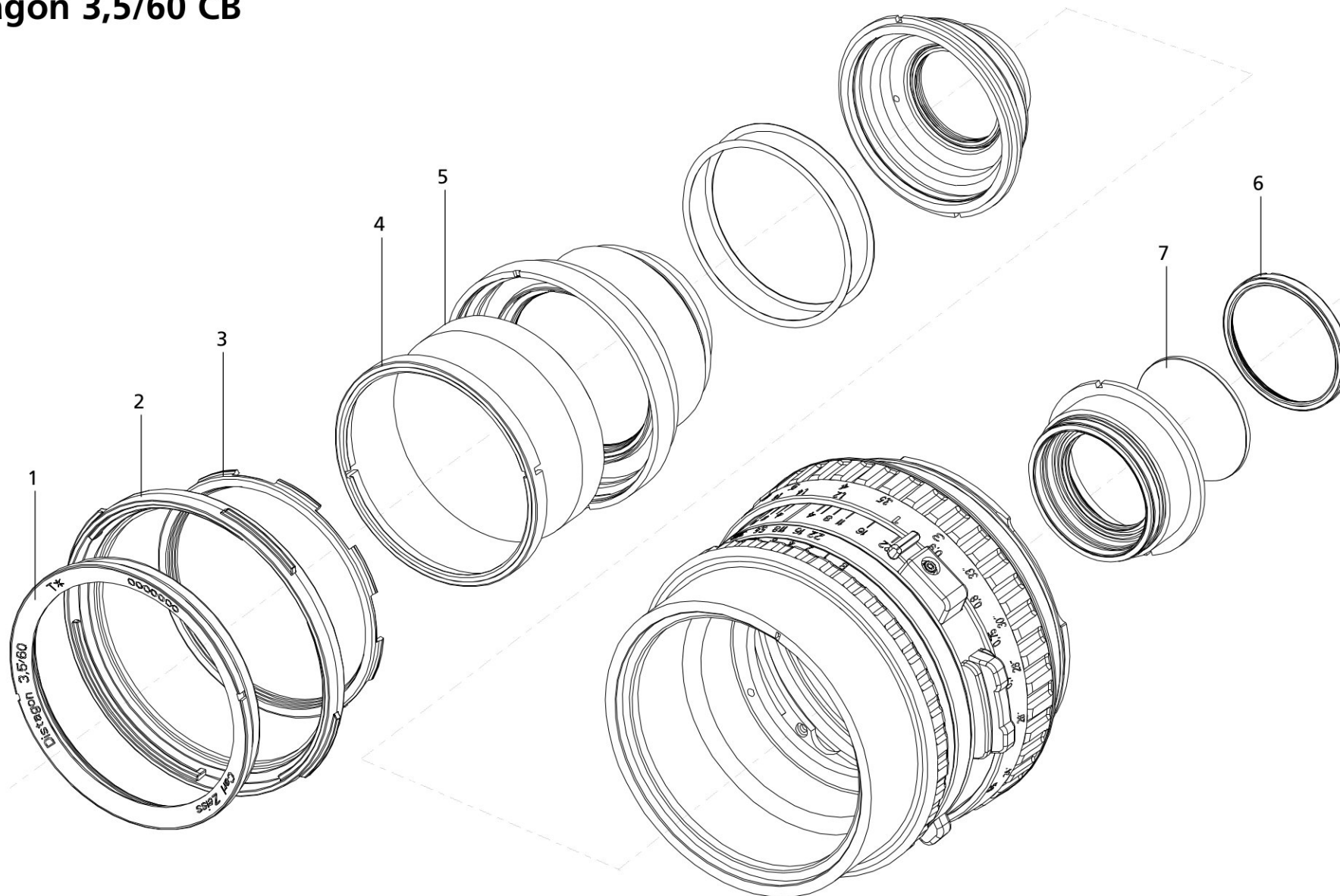


Fig. 02:3:02/2

Pos No.	Pcs	Spare Part No.	Description	Remark
1	1	102165-0011-200	Engraved ring	
2	1	102165-1010-000	Bayonet	
3	1	102165-0012-010	Snap ring	
4	1	104940-0011-000	Lens holding ring	
5	1	104852-0001-010	Front lens	
6	1	104869-0018-000	Lens holding ring	
7	1	104852-0107-000	Rear lens	

03:1:02

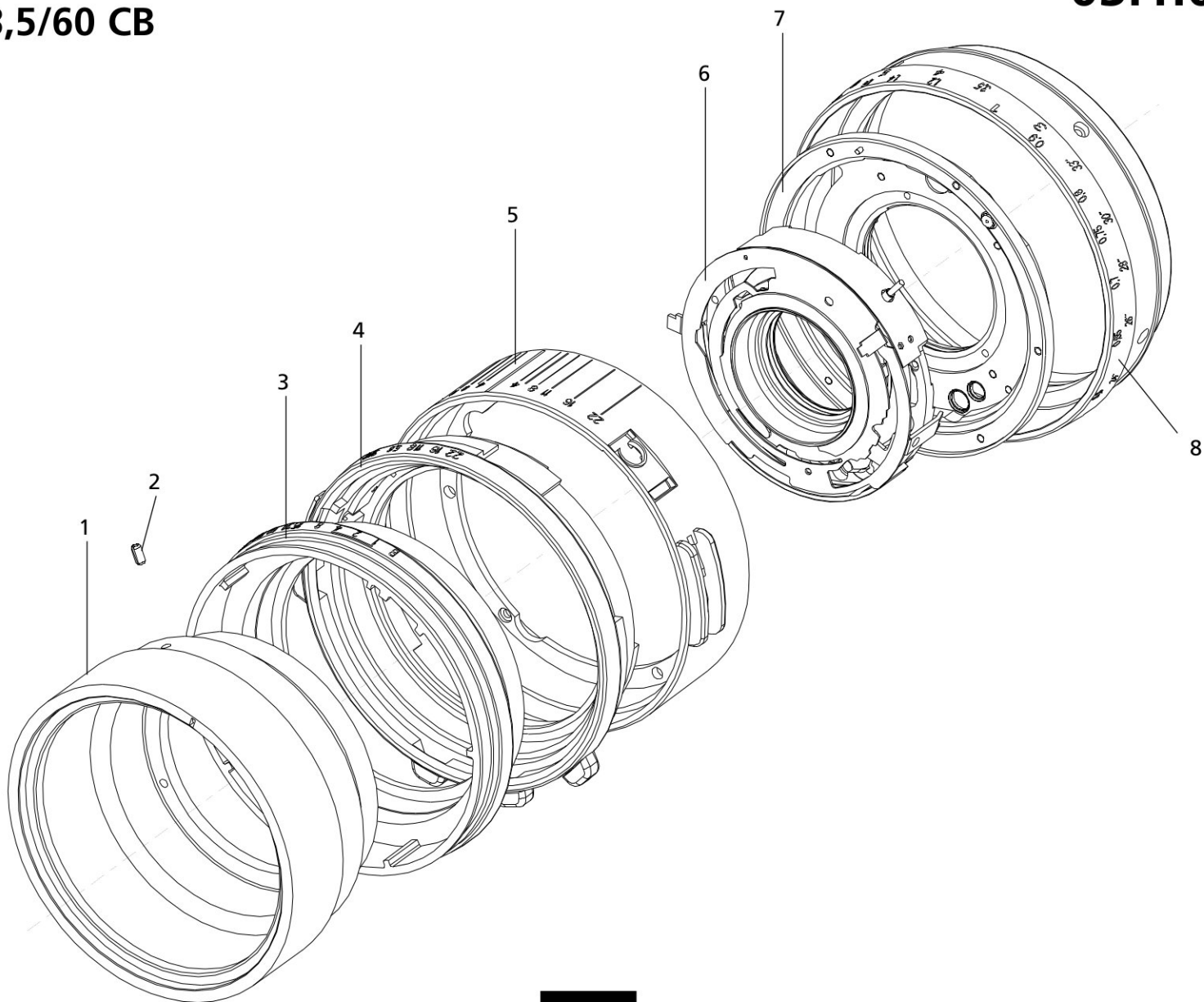
## Distagon 3,5/60 CB



Pos No.	Pcs	Spare Part No.	Description	Remark
1	1	104940-8058-000	Holding ring	
2	1	000000-0095-550	Roll pin	
3	1	100349-1539-010	Setting ring	
4	1	104940-1590-010	Diaphragm clutch ring	
5	1	104940-1744-010	Depth of field ring	
6	1	102212-8602-000	Shutter unit	Details: look at 1:1:11 - 1:1:16 has to be exchanged together with case
7	1	000000-1033-344	Shutter mount + case	
8	1	104940-1026-010	Focusing ring	

03:1:04

## Distagon 3,5/60 CB



**Carl Zeiss**

**Distagon 3,5/60 CB**

**03:2:01**

Pos No.	Pcs	Tool No.	Former Tool No.	Description	Remark
1	1	000000-1054-350	104869-8005-905	Wrench for front element	
2	1	000000-1054-351	104869-8006-902	Wrench for center element	
3	1	000000-1054-352	104869-8007-902	Wrench for rear element	

### Distagon 3,5/60 CB

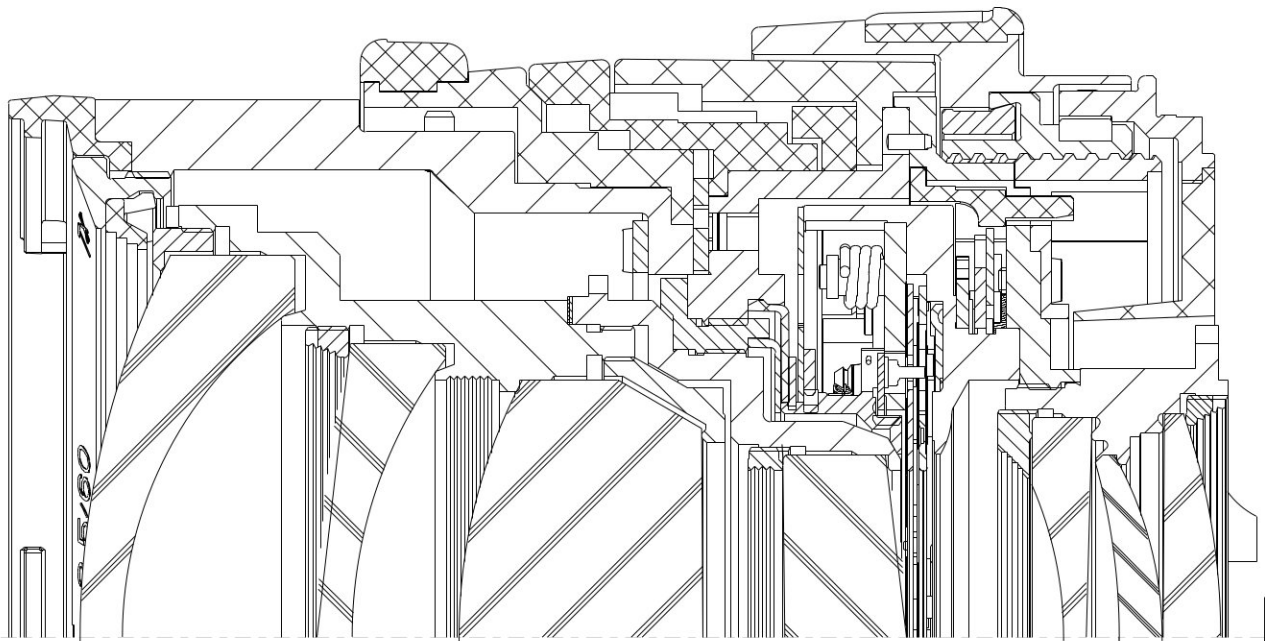


Fig. 03:3:01/1

## Mounting and dismounting of focusing mount

### Focusing mount 102211-8574-000

Used for the following types:

Distagon	3,5/60
Distagon	4/40
Distagon	4/50
Planar	2,8/80

**Note!** The threaded ring and the flange can be put together in any position.

Make sure that the measurement  $4.5 \pm 0.2$  mm is achieved by rotating the focusing mount parts (03:3:02/1-1) against each other.

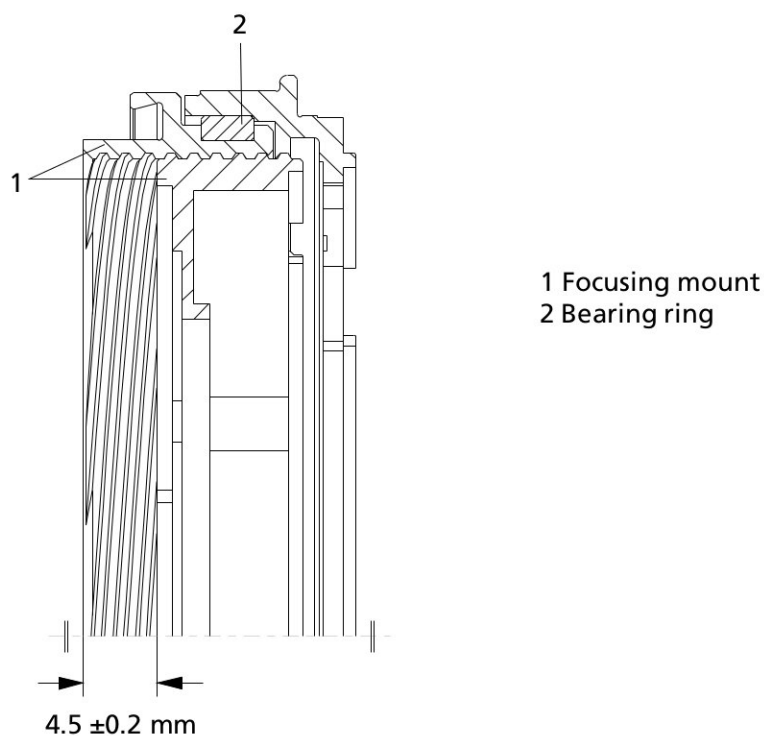
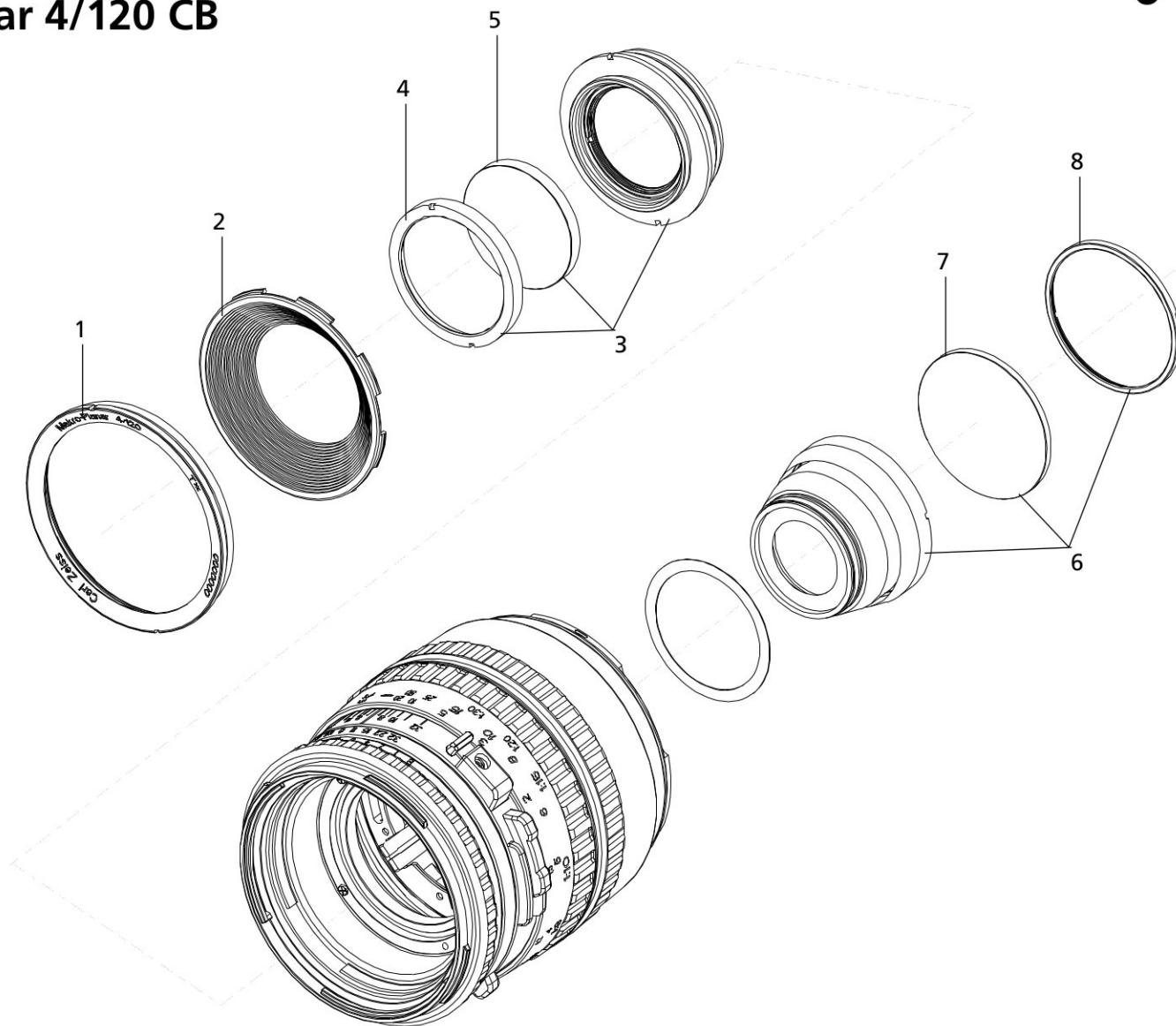


Fig. 03:3:02/1

Pos No.	Pcs	Spare Part No.	Description	Remark
1	1	102165-0011-310	Engraved ring	
2	1	107836-0016-000	Snap ring	
3	1	000000-1004-983	Front lens element	
4	1	107836-0011-000	Lens holding ring	
5	1	107836-0001-000	Front lens	
6	1	000000-1005-010	Rear lens element	
7	1	107836-0006-000	Rear lens	
8	1	107836-0015-000	Lens holding ring	

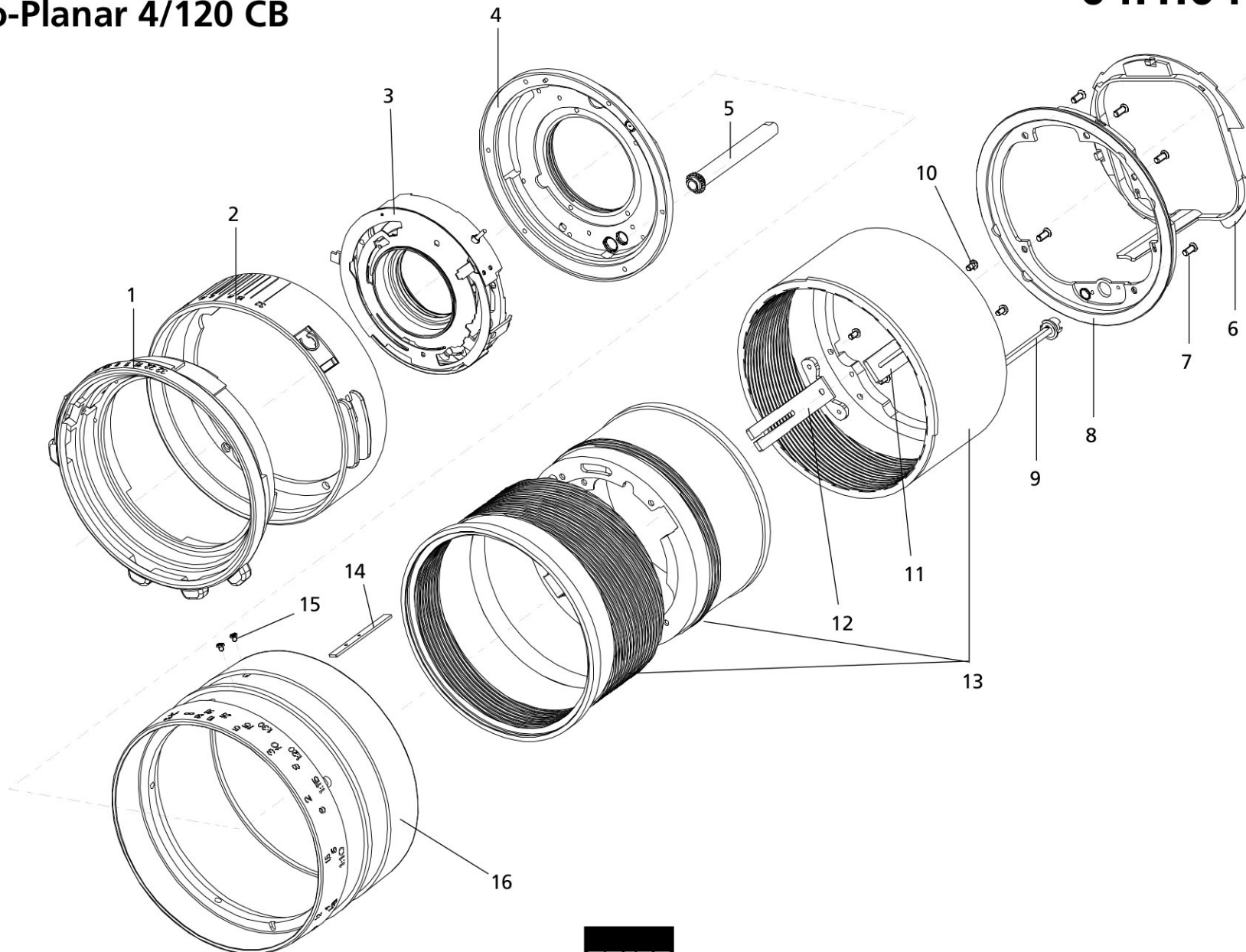
# Makro-Planar 4/120 CB



Pos No.	Pcs	Spare Part No.	Description	Remark
1	1	000000-1034-202	Diaphragm clutch ring	Details: look at 2:1:5 - 2:1:6 has to be exchanged together with case
2	1	000000-1034-206	Depth of field ring	
3	1	100349-8601-000	Shutter unit	
4	1	000000-1033-344	Shutter mount + case	
5	1	109950-0592-000	Telescope bush	
6	1	000000-1034-203	Light tunnel	
7	5	000000-0069-974	Screw	
8	1	000000-1015-939	Bayonet plate	
9	1	109950-0644-000	Telescope shaft	
10	4	000000-0093-535	Screw	
11	1	000000-1034-207	Guide bar	
12	1	000000-1034-208	Guide bar	
13	1	000000-1034-209	Focusing mount, compl.	
14	1	000000-1034-204	Stop	
15	2	000000-0098-795	Screw	
16	1	000000-1034-205	Focusing ring	

# Makro-Planar 4/120 CB

04:1:04



**Carl Zeiss**

**Makro-Planar 4/120 CB**

**04:2:01**

Pos No.	Pcs	Tool No.	Former Tool No.	Description	Remark
1	1	000000-1054-355	107836-8004-906	Wrench for front element	
2	1	000000-1054-356	107836-8005-906	Wrench for rear element	

### Makro-Planar 4/120 CB

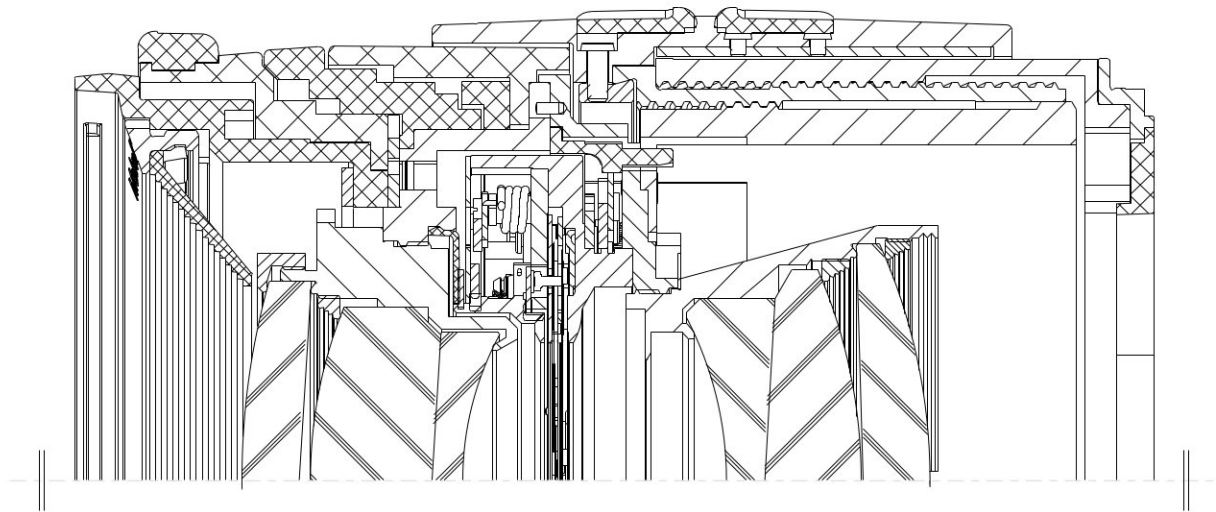


Fig. 04:3:01/1

## Mounting and dismounting of focusing mount

**Recommendation:** Before dismounting the focusing mount mark the positions between the three parts.

**Focusing mount 000000-1034-209**

Used for the following types:	Makro-Planar	4/120
	Sonnar	4/180

- Screw together threaded ring (04:3:02/2-1) and flange (04:3:02/2-2) until face (Pos. B) is even.
- Fit in both parts into the carrier (04:3:02/2-3) according to 04:3:02/1 and screw in until the end.
- Mount one guide bar (turn the carrier to fit in the threads) and measure dimension A.
- In case of deviation: Dismount guide bar, unscrew threaded ring and flange and screw them into the next thread.

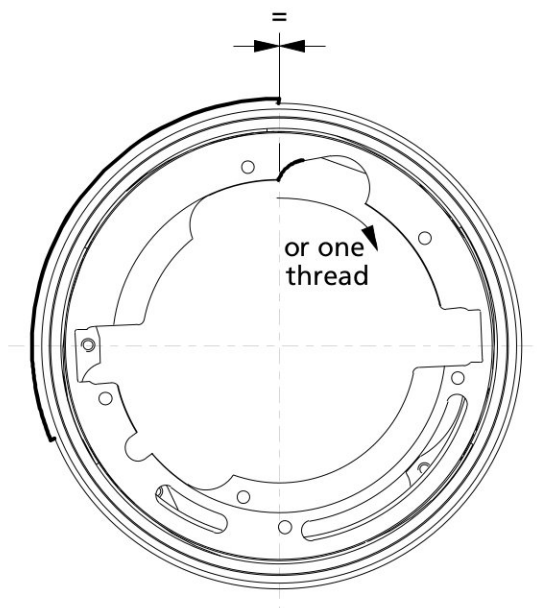


Fig. 04:3:02/1

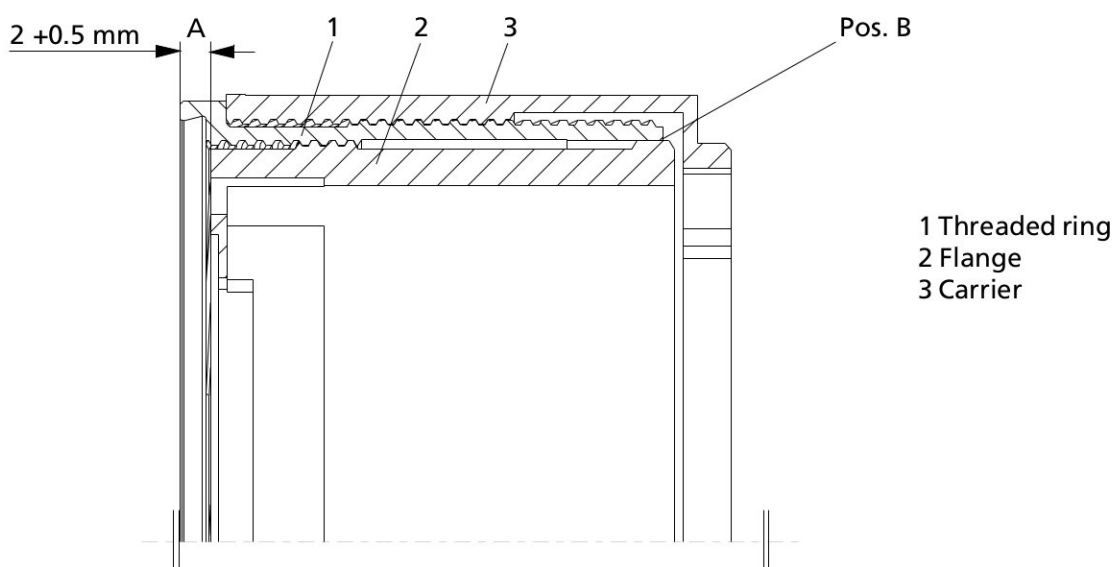
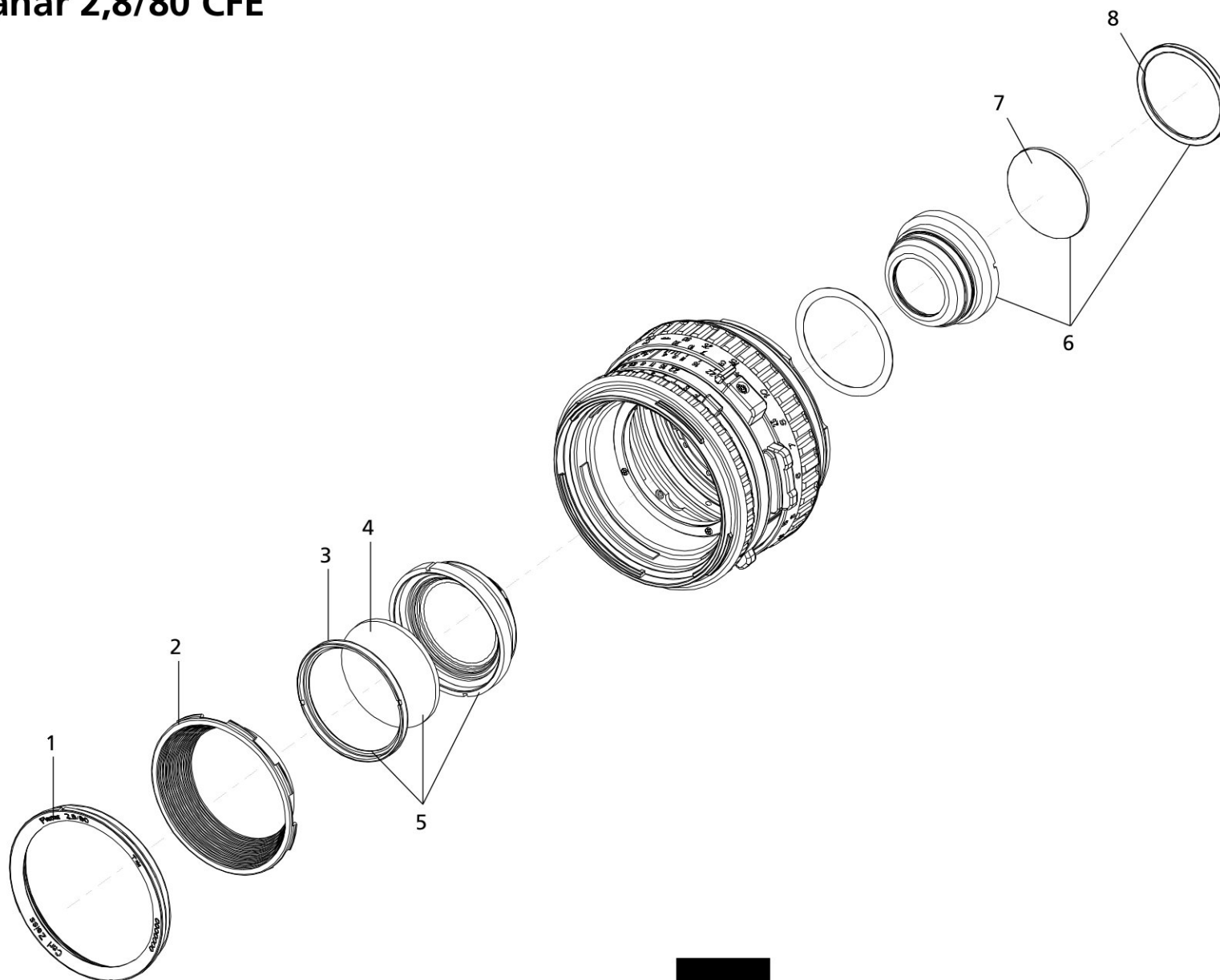


Fig. 04:3:02/2

Pos No.	Pcs	Spare Part No.	Description	Remark
1	1	102165-0011-180	Engraved ring	
2	1	102165-0012-030	Snap ring	
3	1	102210-0014-000	Lens holding ring	
4	1	102076-0101-000	Front lens	
5	1	102210-8005-000	Front lens element	
6	1	102210-8006-000	Rear lens element	
7	1	102076-0107-000	Rear lens	
8	1	102210-0019-000	Lens holding ring	

05:1:02

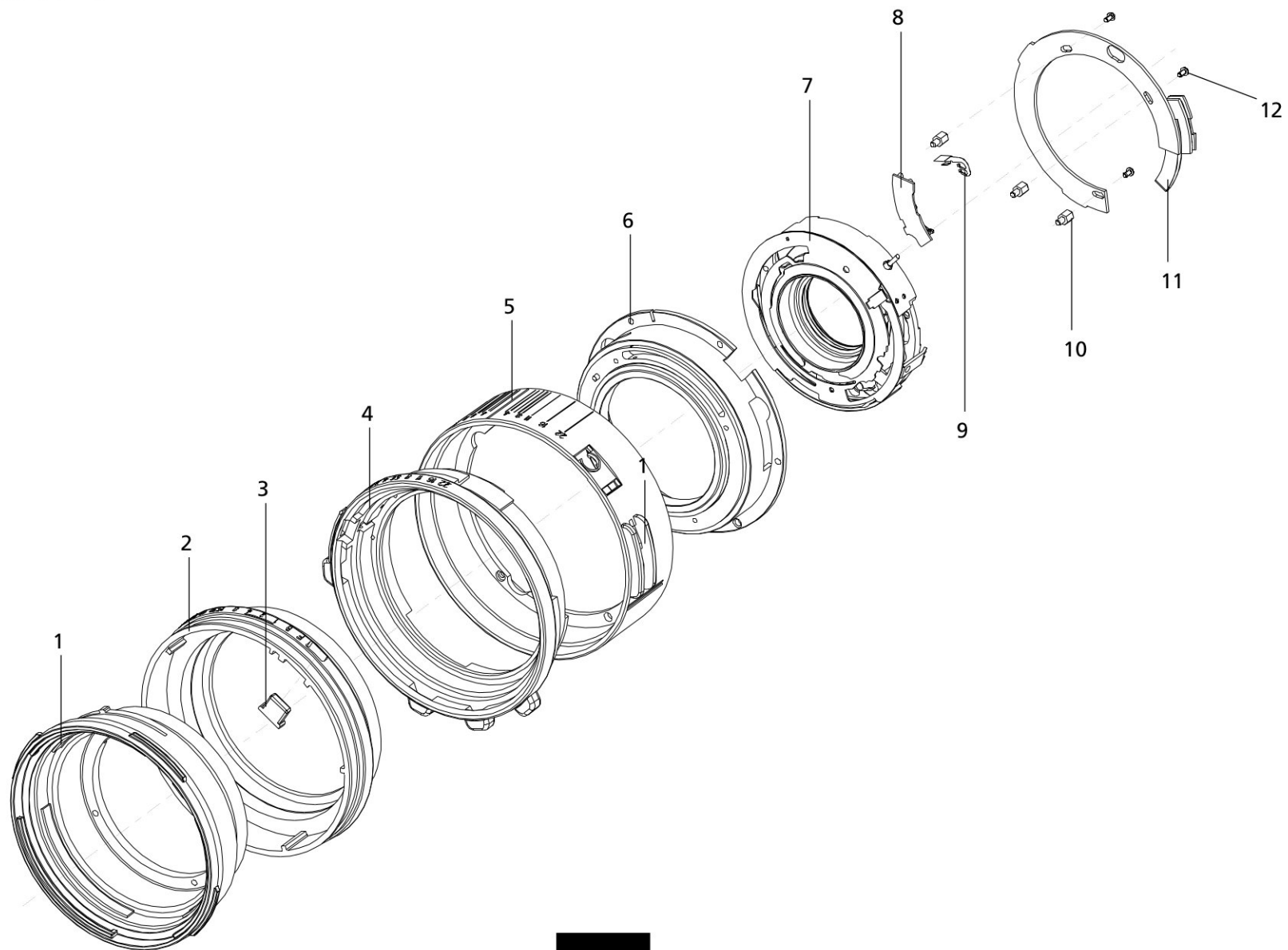
# Planar 2,8/80 CFE



Pos No.	Pcs	Spare Part No.	Description	Remark
1	1	000000-1034-425	Holding ring	
2	1	000000-1034-426	Setting ring	
3	1	000000-1034-427	F-knob	
4	1	102211-1590-010	Diaphragm clutch ring	
5	1	000000-1034-428	Depth of field ring	
6	1	000000-1034-432	Case + shutter mount	has to be exchanged together with shutter mount
7	1	000000-1034-433	Shutter unit	
8	1	000000-1034-434	Contact finger plate	
9	1	000000-1034-429	Contact finger for stop down	
10	3	000000-1034-431	Spacer bolt	VHAB Spare Part No.
11	1	200 509	Printed circuit board	
12	3	000000-0093-535	Screw	

05:1:04

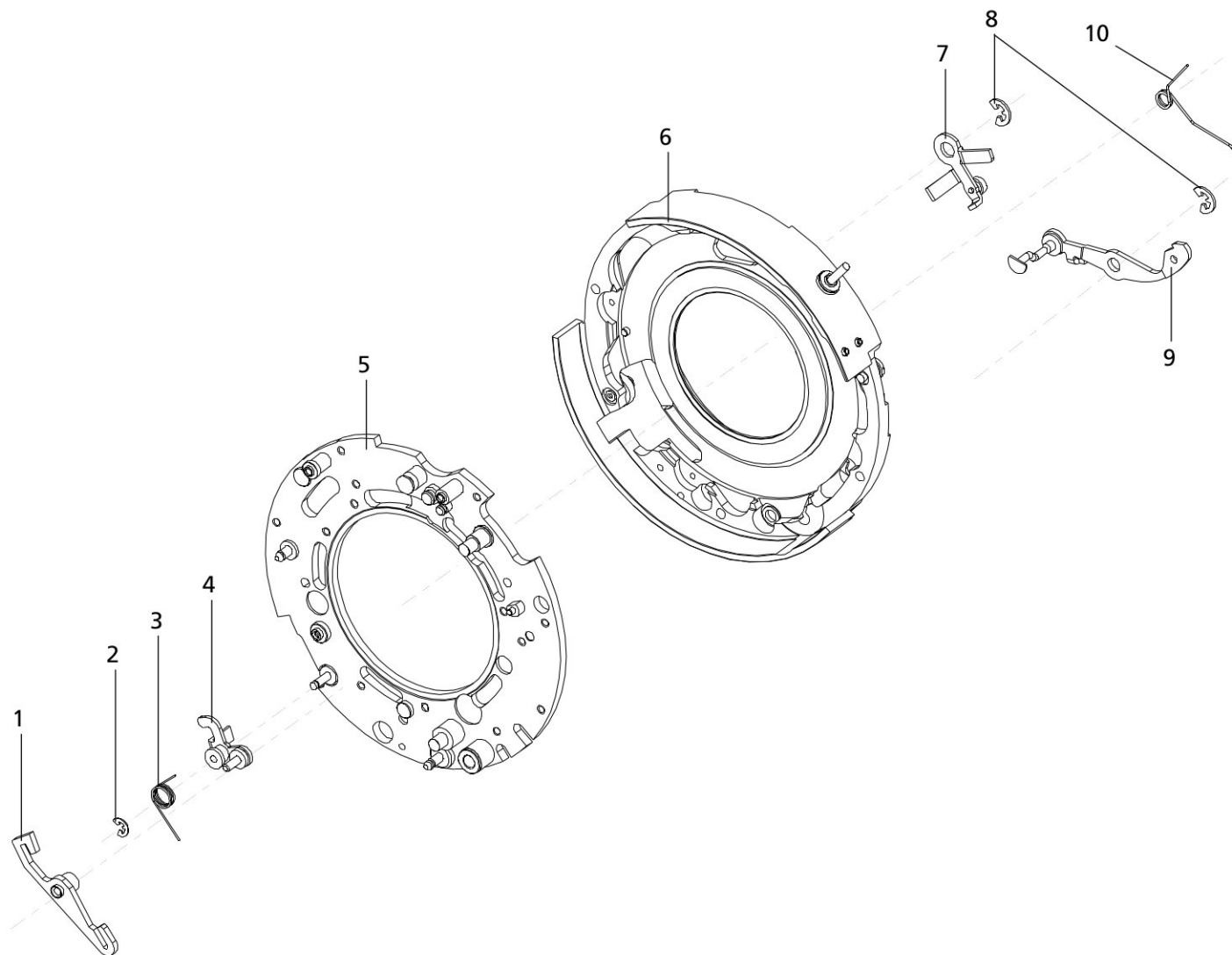
## Planar 2,8/80 CFE



Pos No.	Pcs	Spare Part No.	Description	Remark
1	1	109950-0652-000	Diaphragm switch lever	
2	1	000000-0007-701	Locking washer	
3	1	109950-0651-000	Control pawl spring	
4	1	109950-8050-000	Control pawl, riveted	
5	1	109950-0706-000	Base plate	
6	1	102211-8551-000	Case, riveted	
7	1	109950-8049-000	Control lever, riveted	
8	2	000000-0064-668	Locking washer	
9	1	109950-8048-000	F-locking lever	
10	1	109950-0650-000	F- and control lever spring	

05:1:06

# Planar 2,8/80 CFE



**Carl Zeiss**

**Planar 2,8/80 CFE**

**05:2:01**

Pos No.	Pcs	Tool No.	Former Tool No.	Description	Remark
1	1	000000-1054-353	102210-8005-901	Wrench for front element	
2	1	102210-8006-902	-	Wrench for rear element	

### Planar 2,8/80 CFE

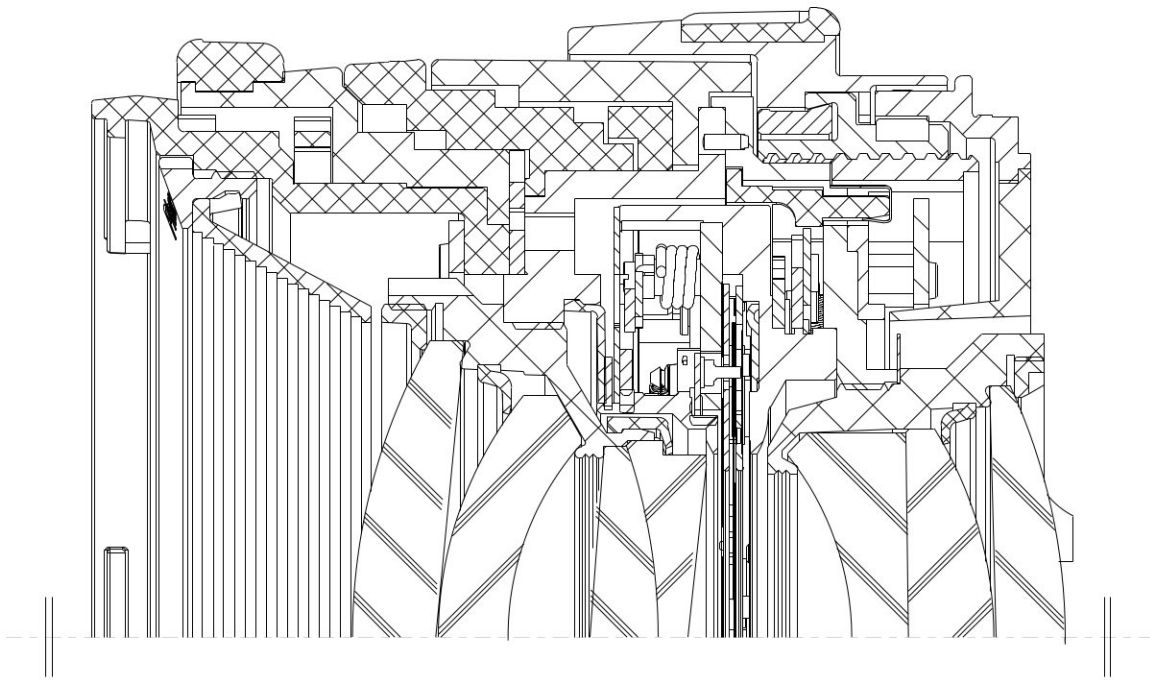


Fig. 05:3:01/1

## Mounting and dismounting of focusing mount

### Focusing mount 102211-8574-000

Used for the following types:

Planar	2,8/80
Distagon	4/40
Distagon	4/50
Distagon	3,5/60

**Note!** The threaded ring and the flange can be put together in any position.

Make sure that the measurement  $4.5 \pm 0.2$  mm is achieved by rotating the focusing mount parts (05:3:02/1-1) against each other.

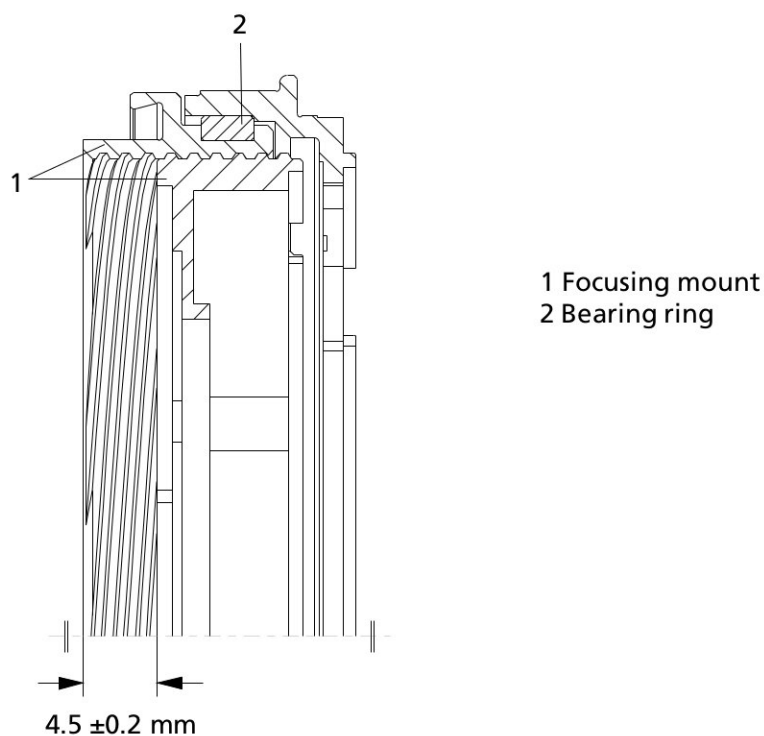
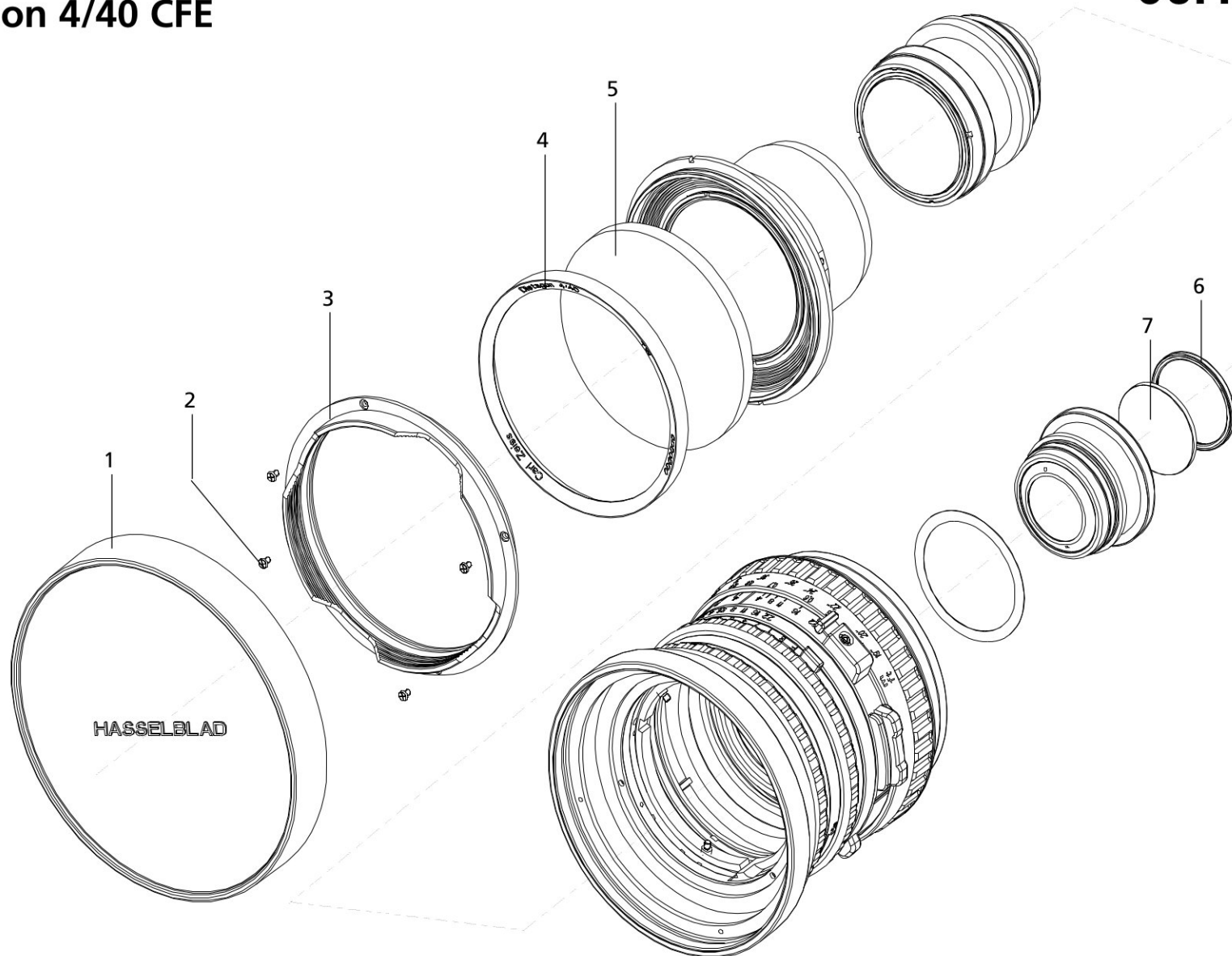


Fig. 05:3:02/1

Pos No.	Pcs	Spare Part No.	Description	Remark
1	1	-	Front lens guard	VHAB Code No. 51654
2	4	000000-0088-598	Screw	
3	1	109950-0667-000	Grooved ring	
4	1	104878-0016-020	Engraved ring	
5	1	104878-0001-000	Front lens	
6	1	104878-0027-000	Lens holding ring	
7	1	104878-0011-000	Rear lens	

06:1:02

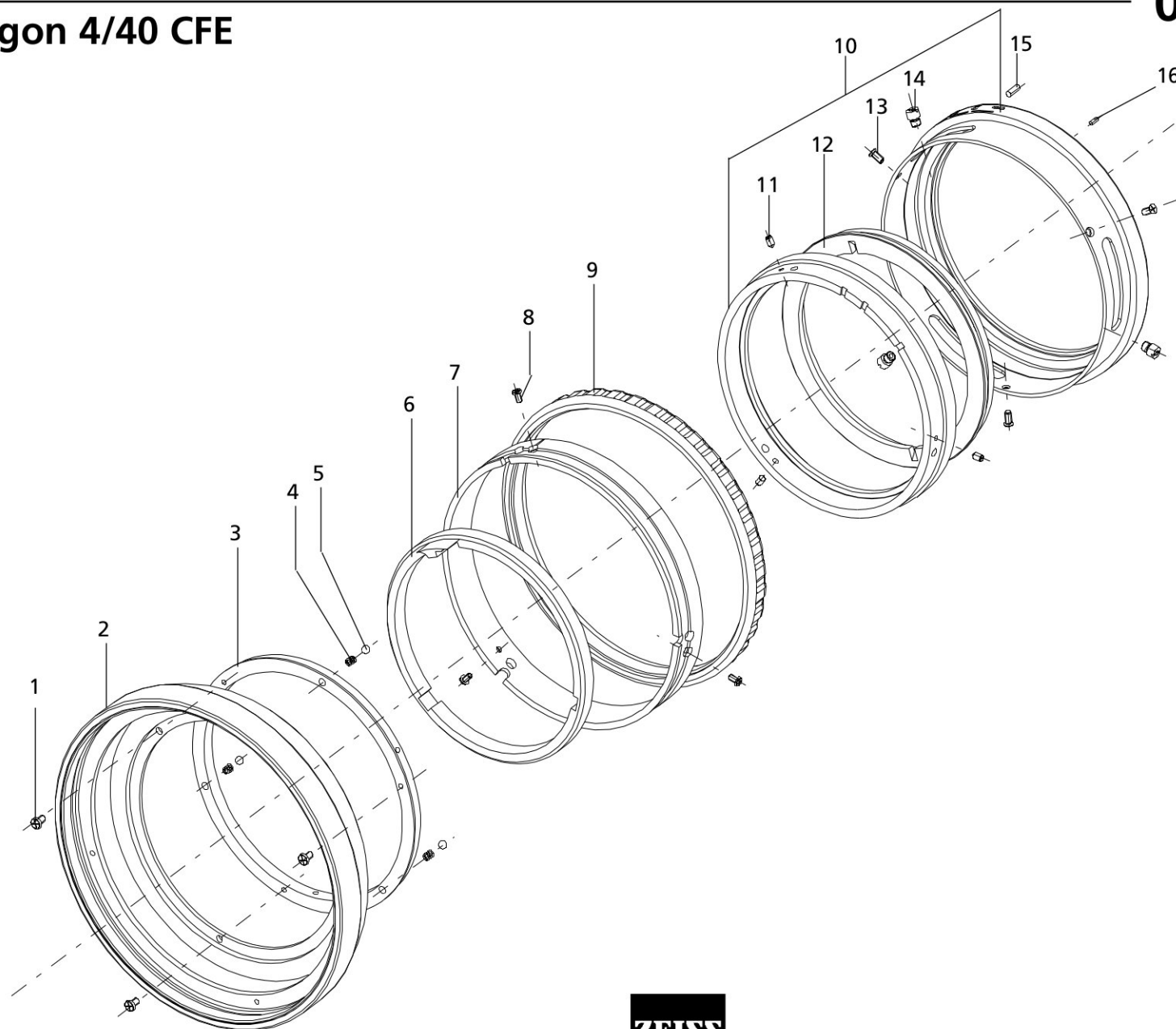
## Distagon 4/40 CFE



Pos No.	Pcs	Spare Part No.	Description	Remark
1	3	000000-0093-535	Screw	
2	1	000000-1034-672	Tube	
3	1	109950-0466-000	Bearing	
4	3	109950-0468-000	Pressure spring	
5	3	000000-0004-810	Ball	
6	1	109950-0464-000	Grooved ring	
7	1	000000-1034-673	Index ring	
8	3	000000-0093-538	Screw	
9	1	102211-1542-000	Focusing grip ring	
10	1	000000-1034-678	Thread flange, fitted	
11	3	000000-0007-054	Threaded pin	
12	1	109950-0462-000	Retaining ring	
13	3	109951-0042-000	Screw	
14	3	000000-1034-674	Stop screw	
15	1	000000-0007-290	Notched cylinder pin	
16	1	000000-0007-238	Notched cylinder pin	

# Distagon 4/40 CFE

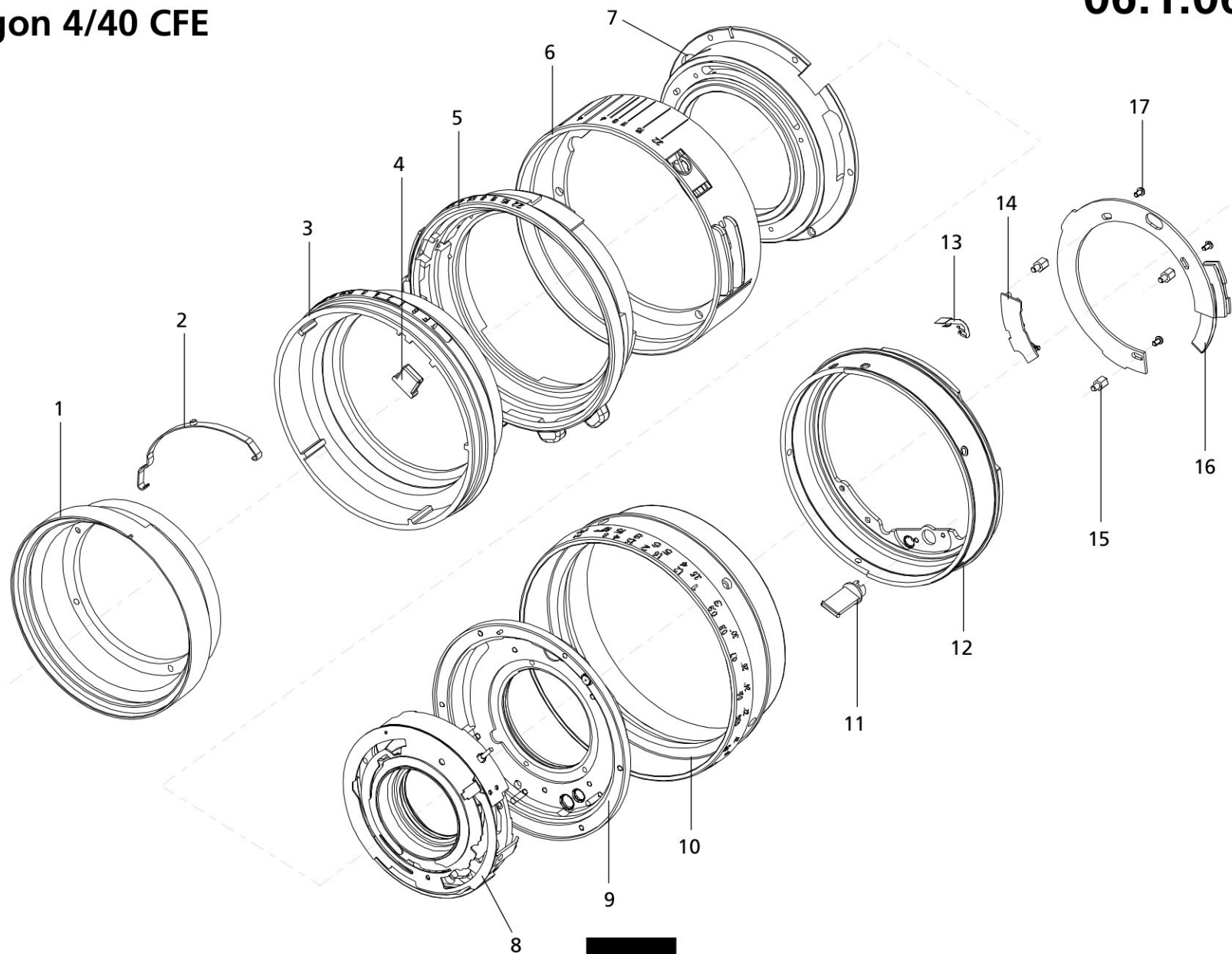
06:1:04



Pos No.	Pcs	Spare Part No.	Description	Remark
1	1	000000-1034-668	Holding ring	
2	1	107882-8560-000	Snap in spring, riveted	
3	1	000000-1034-426	Setting ring	
4	1	000000-1034-427	F-knob	
5	1	000000-1034-669	Diaphragm clutch ring	
6	1	000000-1034-670	Depth of field ring	has to be exchanged together with shutter mount
7	1	000000-1034-793	Case + shutter mount	
8	1	000000-1034-675	Shutter unit	has to be exchanged together with case
9	1	000000-1034-793	Shutter mount + case	
10	1	000000-1034-671	Focusing ring	
11	1	000000-1042-424	Telescope shaft	
12	1	000000-1042-423	Bayonet plate	
13	1	000000-1034-429	Contact finger for stop down	
14	1	000000-1034-676	Contact finger plate	
15	3	000000-1034-431	Spacer bolt	
16	1	200 502	Printed circuit board	VHAB Spare Part No.
17	1	000000-0093-535	Screw	

# Distagon 4/40 CFE

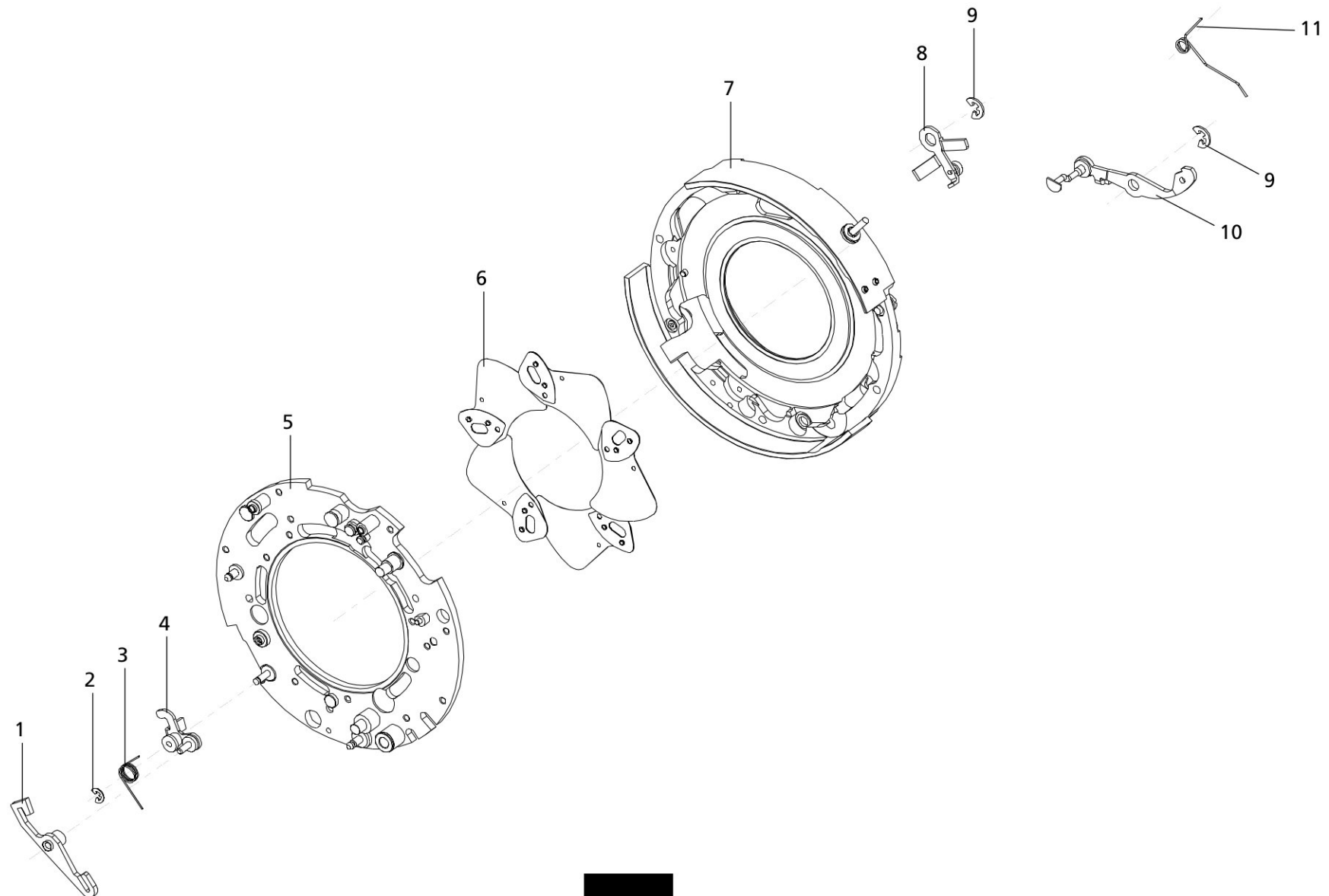
06:1:06



Pos No.	Pcs	Spare Part No.	Description	Remark
1	1	109950-0652-000	Diaphragm switch lever	
2	1	000000-0007-701	Locking washer	
3	1	109950-0651-000	Control pawl spring	
4	1	109950-8050-000	Control pawl, riveted	
5	1	109950-0706-000	Base plate	
6	5	109950-8055-000	Shutter blade	
7	1	102211-8551-000	Case, riveted	
8	1	109950-8049-000	Control lever, riveted	
9	2	000000-0064-668	Locking washer	
10	1	109950-8048-000	F-locking lever	
11	1	109950-0650-000	F- and control lever spring	

# Distagon 4/40 CFE

06:1:08



**Carl Zeiss**

**Distagon 4/40 CFE**

**06:2:01**

Pos No.	Pcs	Tool No.	Former Tool No.	Description	Remark
1	1	104878-8005-907	-	Wrench for front element	
2	1	104878-8006-913	-	Wrench for center element	
3	1	000000-1030-049	-	Wrench for rear element	
4	1	104878-8007-901	-	Wrench for retaining ring	

### Distagon 4/40 CFE

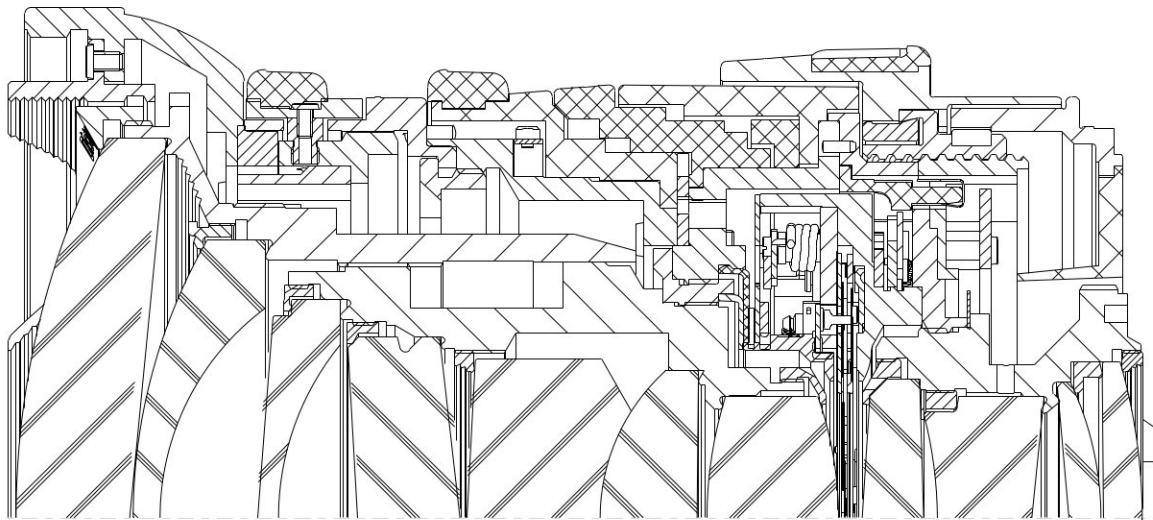


Fig. 06:3:01/1

## Mounting and dismounting of focusing mount

Focusing mount 102211-8574-000

Used for the following types:

Distagon	4/40
Distagon	4/50
Distagon	3,5/60
Planar	2,8/80

**Note!** The threaded ring and the flange can be put together in any position.

Make sure that the measurement  $4.5 \pm 0.2$  mm is achieved by rotating the focusing mount parts (06:3:02/1-1) against each other.

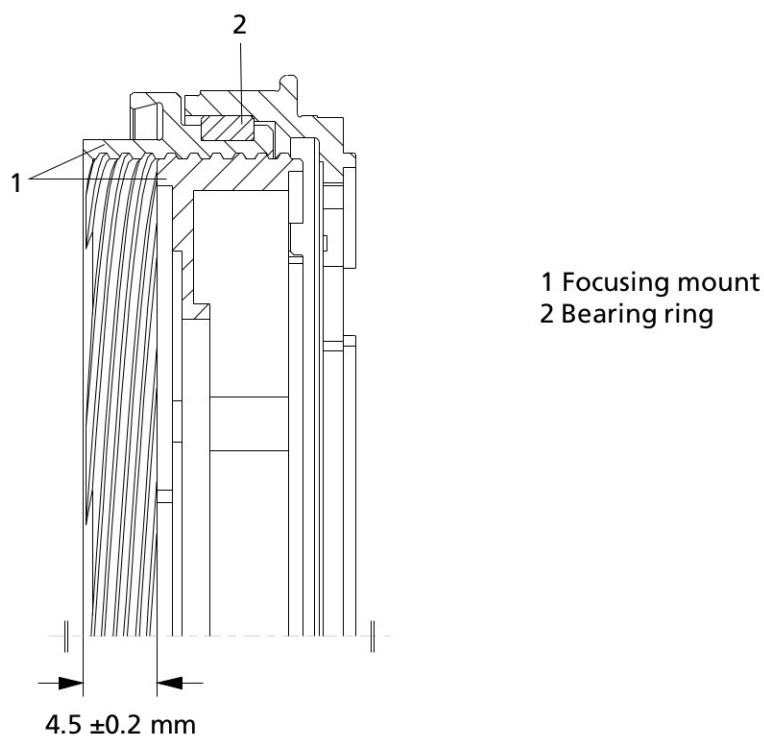
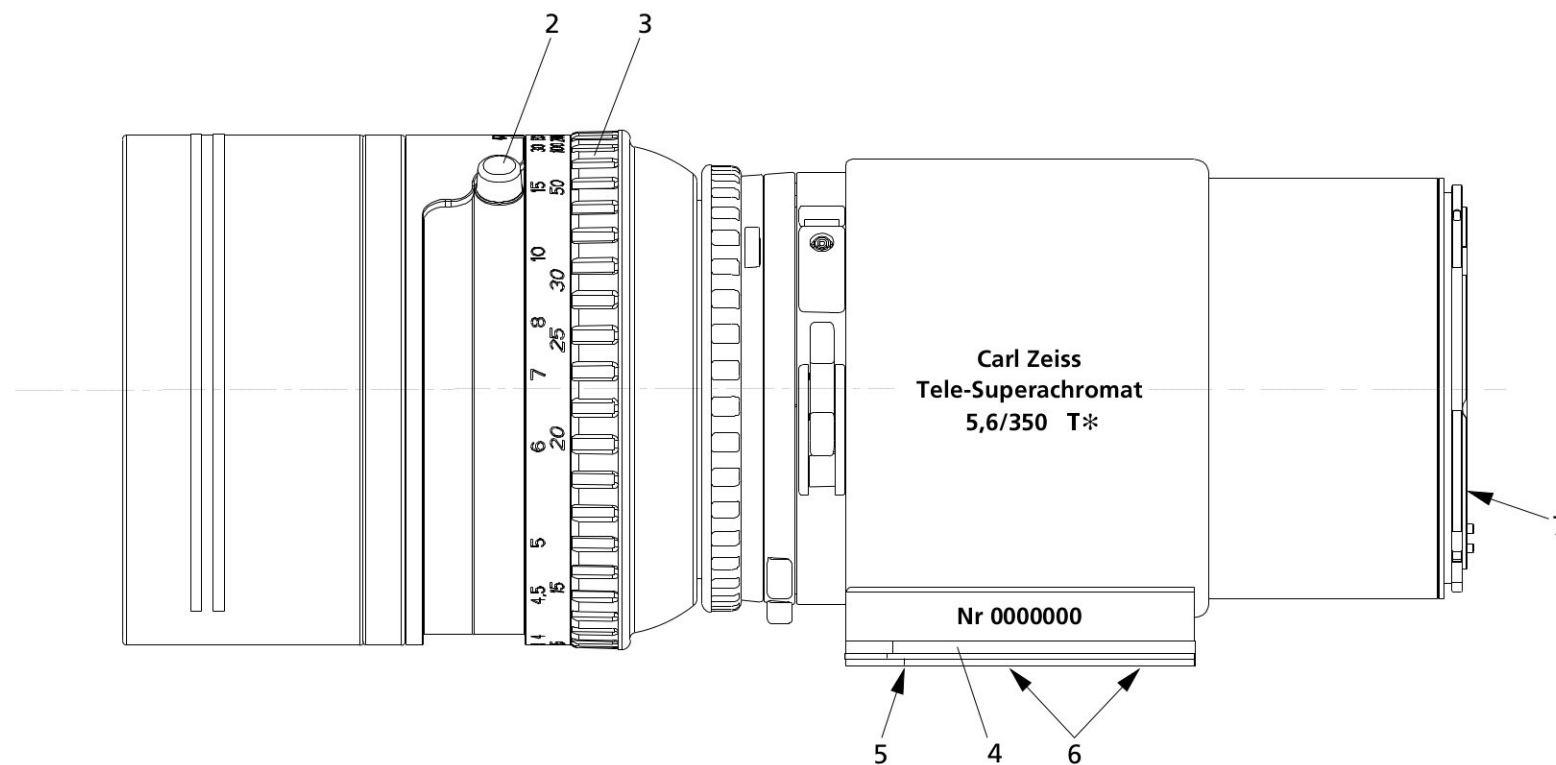


Fig. 06:3:02/1

Pos No.	Pcs	Spare Part No.	Description	Remark
1	1	-	Front lens guard	VHAB Code No. 51654 (not figured)
2	2	104549-1037-000	Rubber knob	
3	1	104549-1036-000	Focusing grip ring	
4	1	30 763	Tripod plate	VHAB Spare Part No.
5	2	829 755	Screw	VHAB Spare Part No. (not figured)
6	4	829 790	Screw	VHAB Spare Part No. (not figured)
7	1	100349-1072-000	Light tunnel	(not figured)

# Tele-Superachromat 5,6/350 CFE



### Tele-Superachromat 5,6/350 CFE

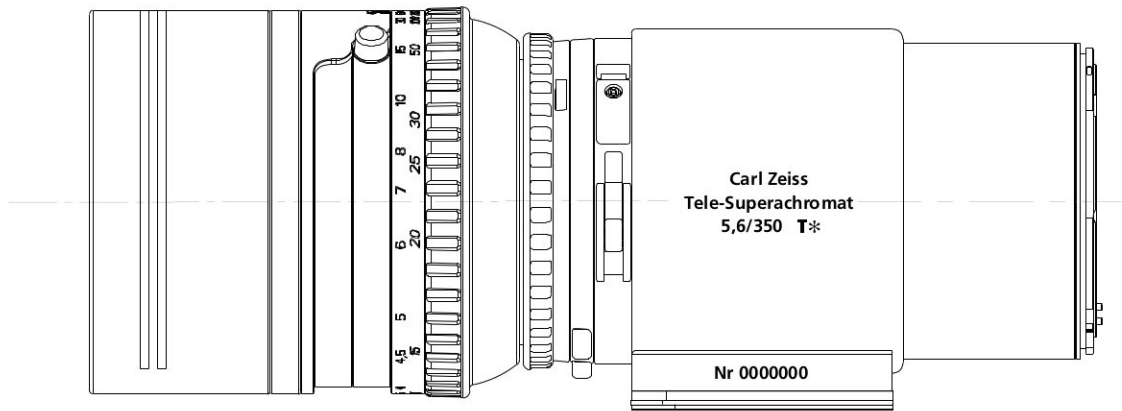


Fig. 07:3:01/1

Each lens has been adjusted individually. Repair works may not be carried out with the exception of the replacement of the parts mentioned in the spare part list of this lens. In case of damage please send the complete lens to:

Carl Zeiss  
D-73446 Oberkochen

Pos No.	Pcs	Spare Part No.	Description	Remark
1	1	-	Front lens guard	VHAB Code No. 50709
2	1	104877-0012-010	Lens holding ring	
3	1	104813-0101-010	Front lens	
4	1	104813-0039-000	Washer	
5	1	000000-0069-911	Screw	
6	1	104877-0011-000	Washer	
7	1	104813-8010-000	Neutral glass	
7	1	104813-8011-000	Filter Or 57	
7	1	104813-8012-000	Filter Y 50	
7	1	104813-8013-000	Filter B 11	
8	1	000000-1010-224	Flange	
9	4	000000-0089-029	Screw	
10	1	101025-0217-000	Lens holding ring	
11	1	104813-0008-000	Rear lens	

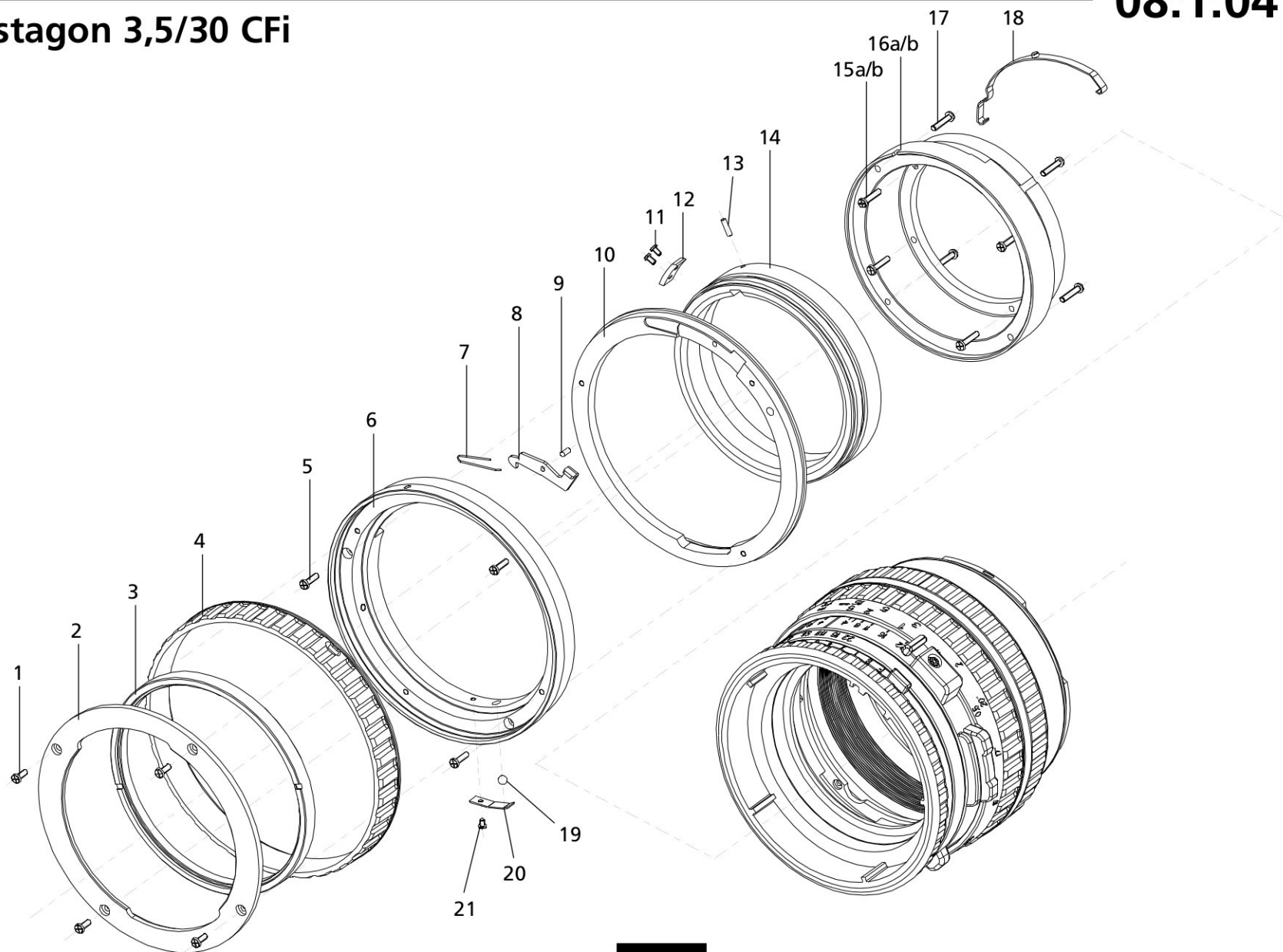
08:1:02



Pos No.	Pcs	Spare Part No.	Description	Remark
1	4	000000-0069-908	Screw	has to be exchanged together with Pos No. 14
2	1	109950-0503-000	Bayonet ring	
3	1	000000-1038-875	Threaded ring	
4	1	000000-1038-864	Rubber ring	
5	3	000000-0098-468	Screw	
6	1	000000-1038-863	Index ring	
7	1	109950-0498-000	Spring	
8	1	109950-0497-000	Lever	
9	1	000000-0007-283	Cylinder pin	
10	1	000000-1038-865	Ring	
11	2	000000-0069-911	Screw	has to be exchanged together with Pos No. 3 replace it by the same type (cheese head screw)
12	1	109950-0501-000	Stop	
13	1	000000-0050-208	Cylinder pin	
14	1	109950-0494-000	Tube	
15a	4	000000-0069-933	Screw	
15b	4	000000-1099-929	Screw	
16a	1	000000-1038-866	Holding ring	
16b	1	000000-1099-917	Holding ring	
17	4	000000-0069-933	Screw	
18	1	107882-8560-000	Snap in spring	
19	1	000000-0004-814	Ball	replace it by the same type (countersunk screw) replace it by the same type (for cheese head screws) replace it by the same type (for countersunk screws)
20	1	109950-0502-000	Flat spring	
21	1	000000-0069-921	Screw	

08:1:04

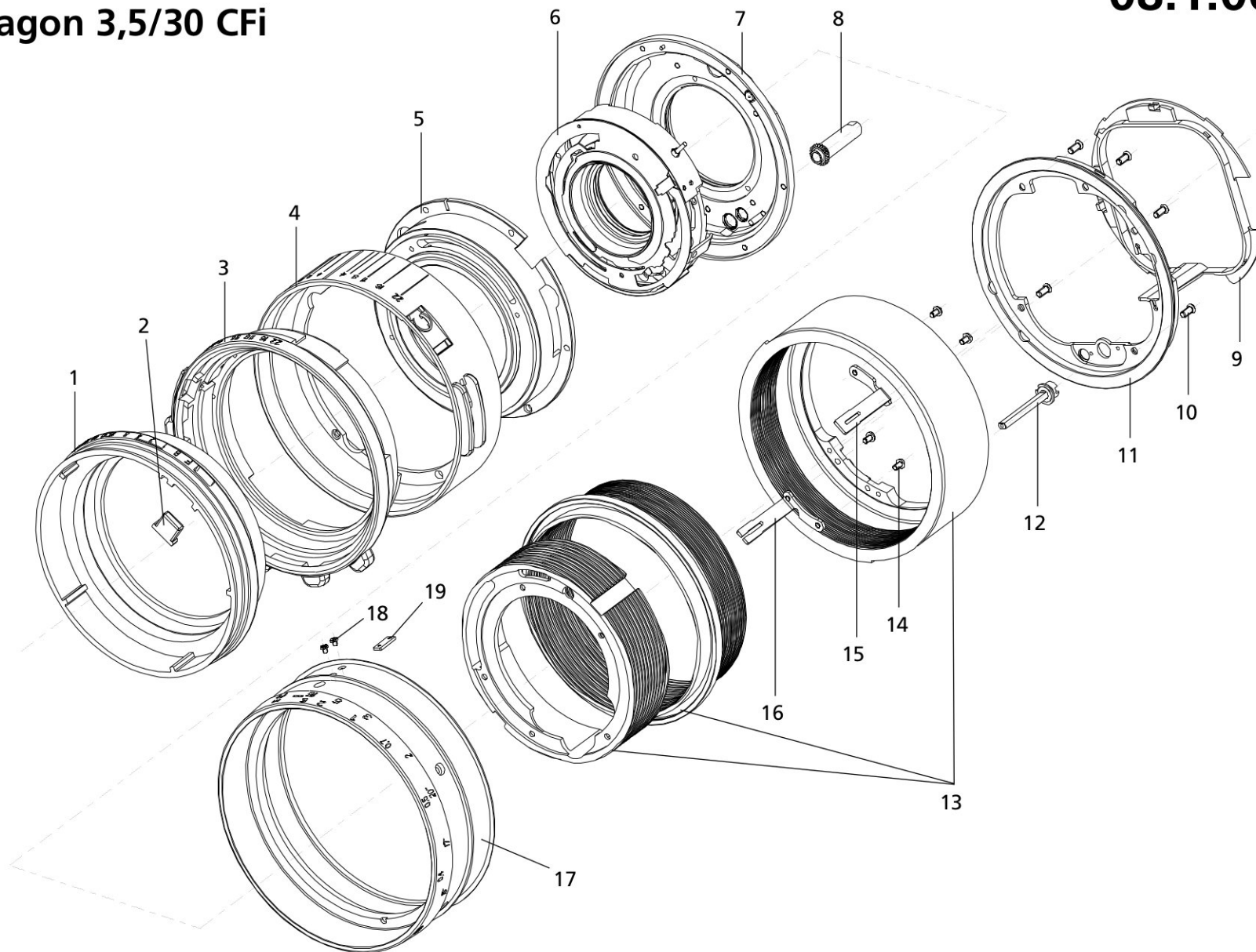
## F-Distagon 3,5/30 CFi



Pos No.	Pcs	Spare Part No.	Description	Remark
1	1	000000-1034-426	Setting ring	has to be exchanged together with shutter mount
2	1	000000-1034-427	F-knob	
3	1	000000-1038-867	Diaphragm clutch ring	
4	1	000000-1038-868	Depth of field ring	
5	1	000000-1034-793	Case + shutter mount	
6	1	000000-1034-675	Shutter unit	Details: look at 06:1:07 - 06:1:08 has to be exchanged together with case
7	1	000000-1034-793	Shutter mount + case	
8	1	109950-0594-000	Telescope bush	
9	1	000000-1038-869	Light tunnel	
10	5	000000-0069-974	Screw	
11	1	000000-1015-939	Bayonet plate	
12	1	000000-1026-109	Telescope shaft	
13	1	000000-1038-871	Focusing mount, complete	
14	4	000000-0093-535	Screw	
15	1	000000-1038-872	Guide bar	
16	1	000000-1038-873	Guide bar	
17	1	000000-1038-874	Focusing ring	
18	2	000000-0098-795	Screw	
19	1	109950-0481-000	Stop	

08:1:06

## F-Distagon 3,5/30 CFi



**Carl Zeiss**

**F-Distagon 3,5/30 CFi**

**08:2:01**

Pos No.	Pcs	Tool No.	Former Tool No.	Description	Remark
1	1	000000-1054-348	104813-8007-901	Wrench for center element	
2	1	000000-1054-347	104877-8003-904	Wrench for rear element	

### F-Distagon 3,5/30 CFi

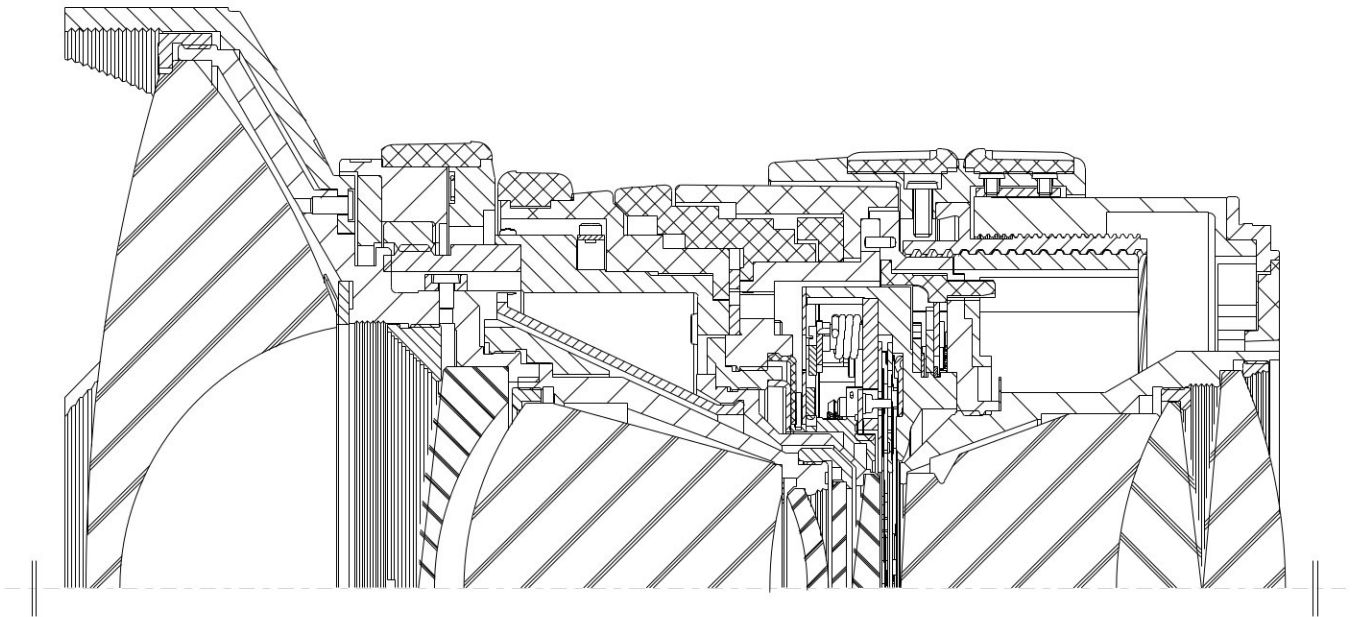


Fig. 08:3:01/1

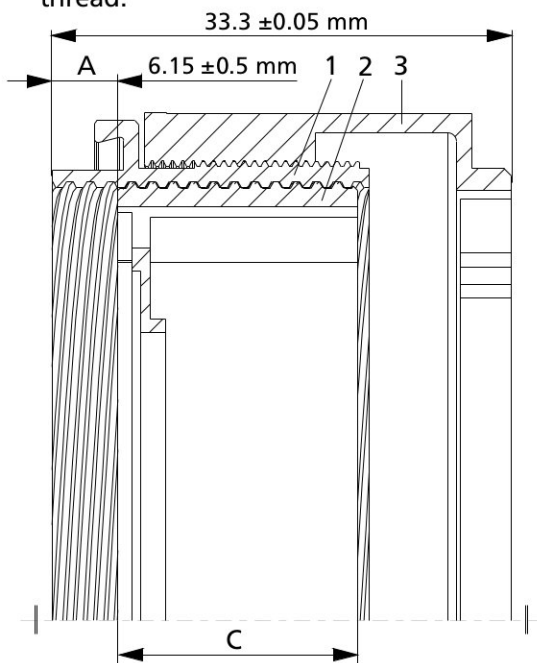
## Mounting and dismounting of focusing mount

**Recommendation:** Before dismounting the focusing mount mark the positions between the three parts.

**Focusing mount 000000-1038-871**

Used for the following type: F-Distagon 3,5/30

- Screw together threaded ring (08:3:02/1-1) and flange (08:3:02/1-2) until the total length is  $33.3 \pm 0.05$  mm.
- Measure dimension C of flange (08:3:02/1-2).
- If dimension C = 20.0 mm – Fit in flange (08:3:02/1-2) according to 08:3:02/2.
- If dimension C = 17.5 mm – Fit in flange (08:3:02/1-2) according to 08:3:02/3.
- Mount one guide bar (turn the carrier to fit in the treads) and measure dimension A.
- In case of deviation: Dismount guide bar, unscrew flange (08:3:02/1-2) and screw it into the next thread.



1 Threaded ring  
2 Flange  
3 Carrier

Fig. 08:3:02/1

± one thread

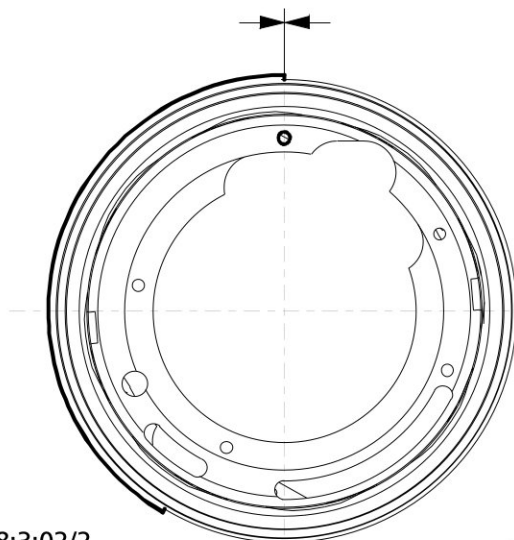


Fig. 08:3:02/2

± one thread

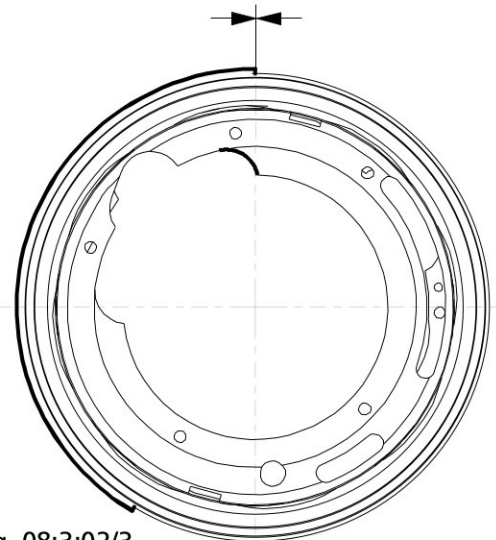
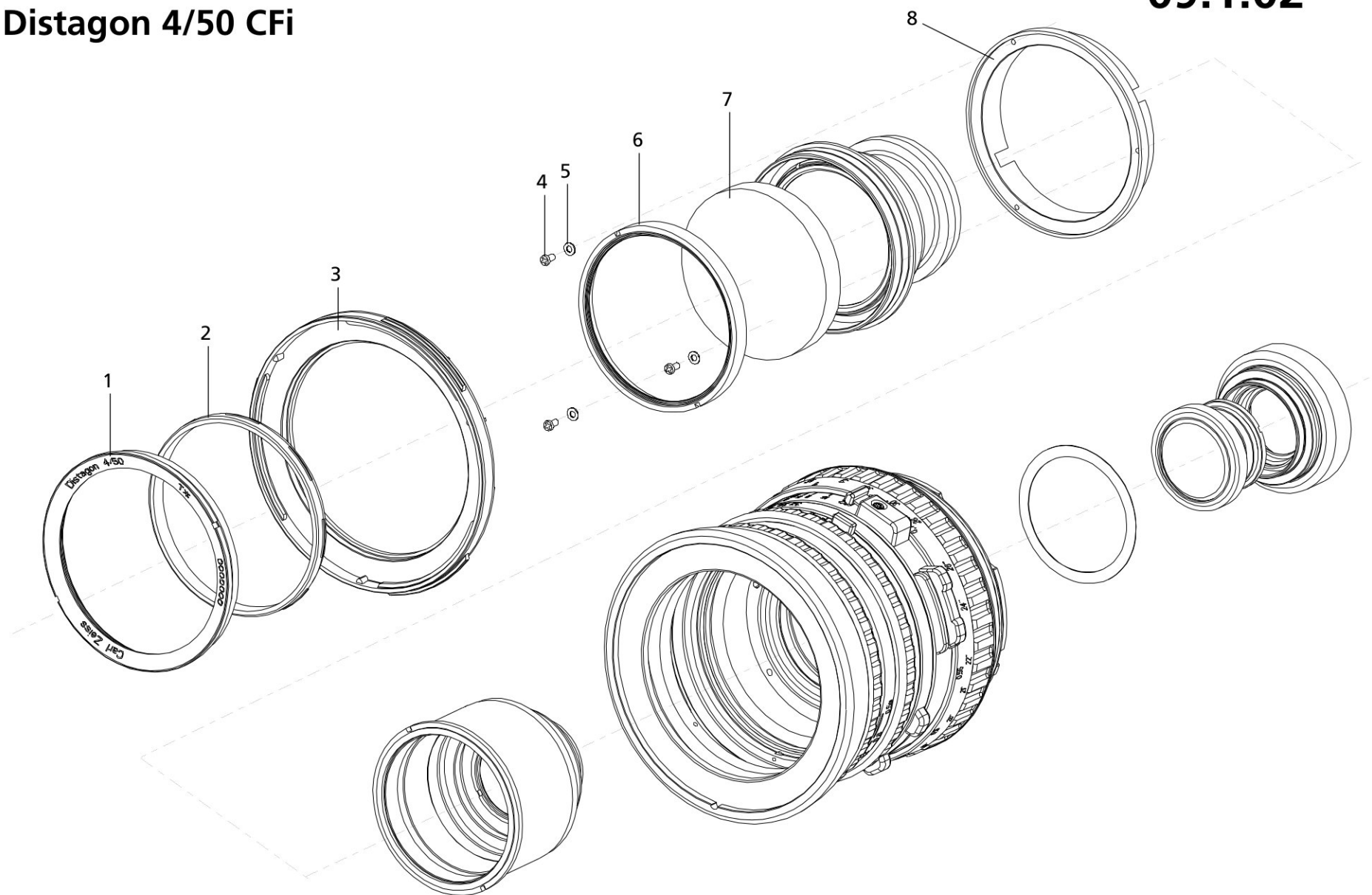


Fig. 08:3:02/3

Pos No.	Pcs	Spare Part No.	Description	Remark
1	1	102165-0011-370	Engraved ring	
2	1	104908-0022-000	Snap ring	
3	1	104931-1010-000	Bayonet	
4	3	000000-0083-974	Screw	
5	3	000000-0069-940	Washer	
6	1	104908-0011-000	Lens holding ring	
7	1	104908-0001-010	Front lens	
8	1	104908-0023-000	Transfer ring	

09:1:02

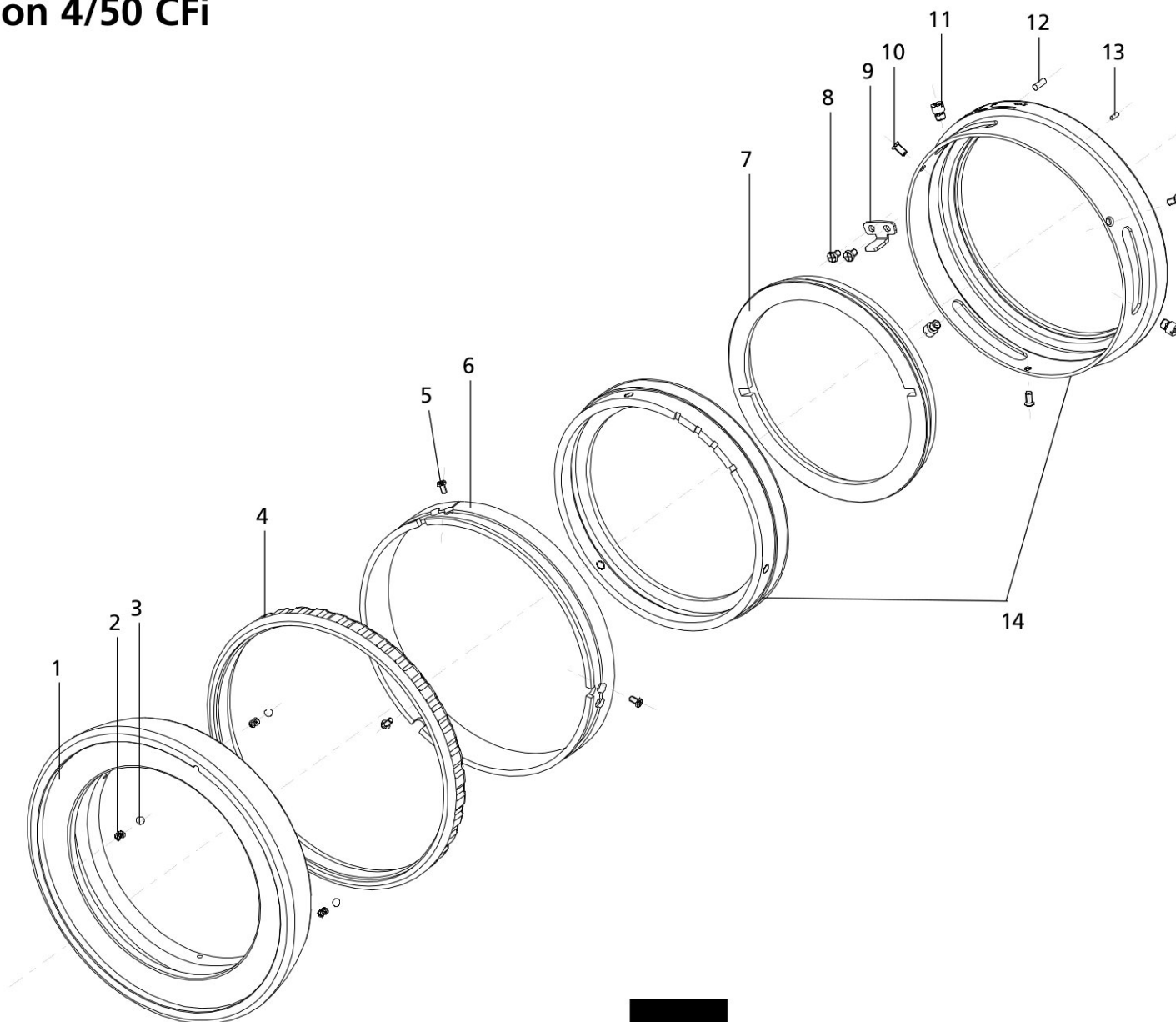
# Distagon 4/50 CFI



Pos No.	Pcs	Spare Part No.	Description	Remark
1	1	000000-1038-878	Intermediate ring	
2	3	109950-0468-000	Pressure spring	
3	3	000000-0004-810	Ball	
4	1	102211-1542-000	Grip ring	
5	3	000000-0093-538	Screw	
6	1	000000-1038-879	Index ring	
7	1	109950-0462-000	Fixing ring	
8	2	000000-0088-598	Screw	
9	1	109950-0760-000	Guide angle	
10	3	109951-0042-000	Screw	
11	3	000000-1034-674	Stop screw	
12	1	000000-0007-290	Pin	
13	1	000000-0007-238	Pin	
14	1	000000-1038-880	Threaded flange, fitted	

09:1:04

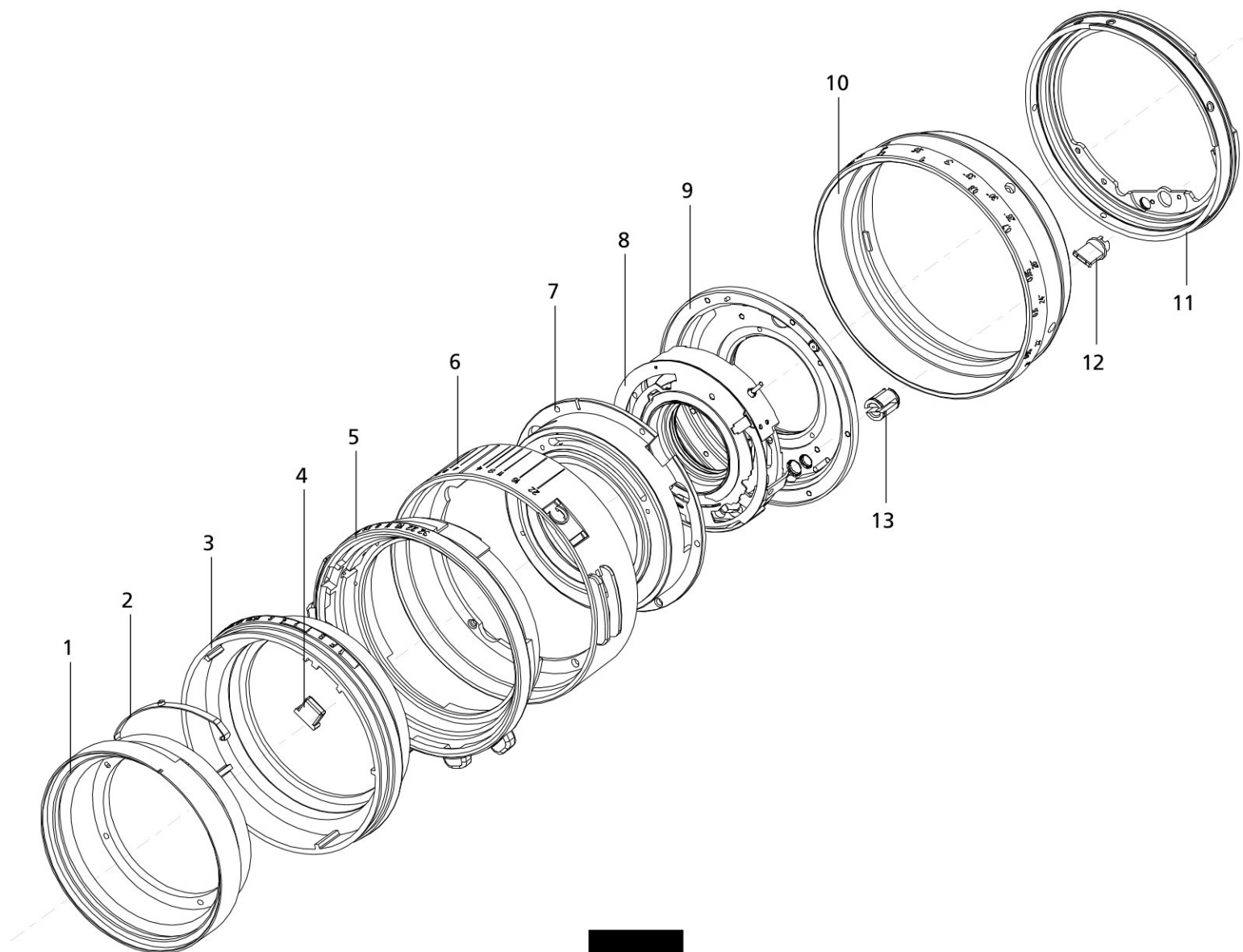
## Distagon 4/50 CFI



Pos No.	Pcs	Spare Part No.	Description	Remark
1	1	000000-1034-668	Holding ring	has to be exchanged together with shutter mount Details: look at 06:1:07 - 06:1:08 has to be exchanged together with case
2	1	107882-8560-000	Snap in spring	
3	1	000000-1034-426	Setting ring	
4	1	000000-1034-427	F-knob	
5	1	000000-1038-881	Diaphragm ring	
6	1	000000-1038-882	Depth of field ring	
7	1	000000-1034-793	Case + shutter mount	
8	1	000000-1034-675	Shutter unit	
9	1	000000-1034-793	Shutter mount + case	
10	1	000000-1038-883	Focusing ring	
11	1	000000-1038-884	Bayonet plate	
12	1	000000-1038-885	Telescope shaft	
13	1	000000-1038-886	Intermediate telescope shaft	

09:1:06

## Distagon 4/50 CFI



**Carl Zeiss**

**Distagon 4/50 CFI**

**09:2:01**

Pos No.	Pcs	Tool No.	Former Tool No.	Description	Remark
1	1	000000-1037-017	-	Wrench for front element	
2	1	104908-8003-907	-	Wrench for center element	
3	1	000000-1054-349	104908-8105-901	Wrench for rear element	
4	1	104878-8007-901	-	Wrench for retaining ring	

### Distagon 4/50 CFi

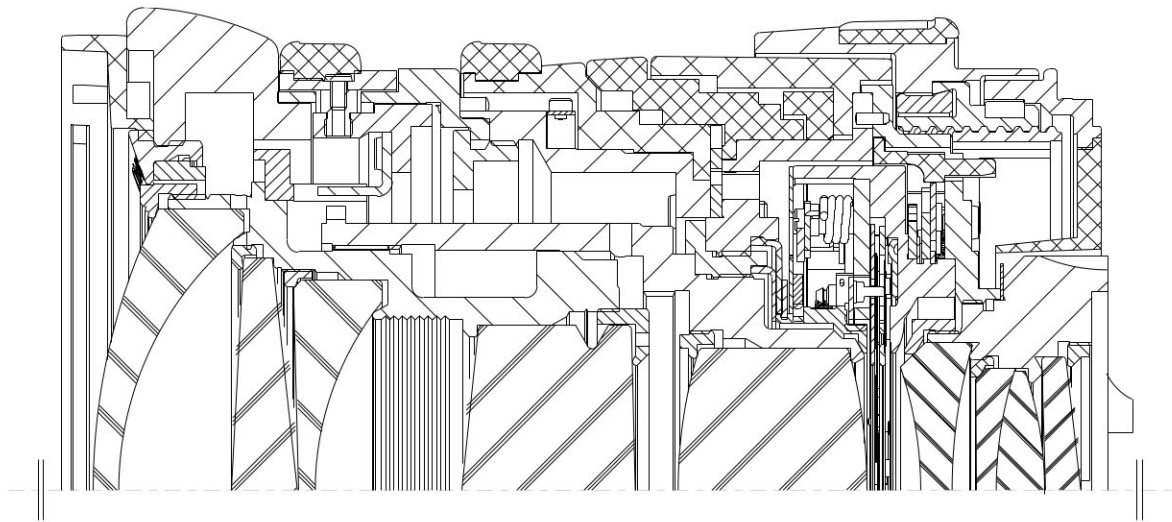


Fig. 09:3:01/1

## Mounting and dismounting of focusing mount

### Focusing mount 102211-8574-000

Used for the following types:

Distagon	4/50
Distagon	4/40
Distagon	3,5/60
Planar	2,8/80

**Note!** The threaded ring and the flange can be put together in any position.

Make sure that the measurement  $4.5 \pm 0.2$  mm is achieved by rotating the focusing mount parts (09:3:02/1-1) against each other.

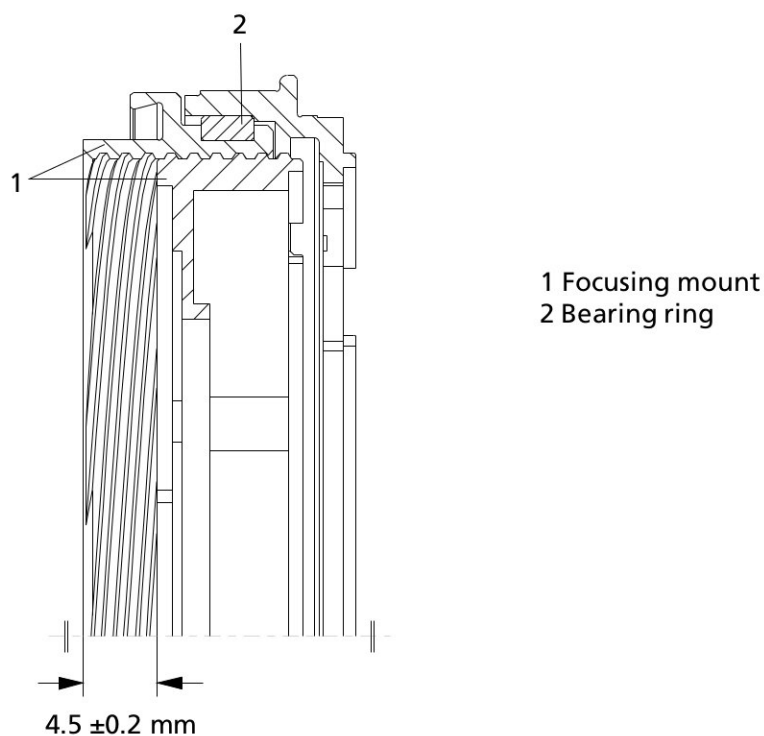


Fig. 09:3:02/1

Pos No.	Pcs	Spare Part No.	Description	Remark
1	1	000000-1010-362	Engraved ring	
2	1	102165-0012-030	Snap ring	
3	1	102166-8105-000	Front lens element	
4	1	102165-0014-000	Lens holding ring	
5	1	102111-0001-000	Front lens	
6	1	000000-1010-366	Rear lens element	
7	1	102111-0105-000	Rear lens	
8	1	102111-0020-000	Lens holding ring	

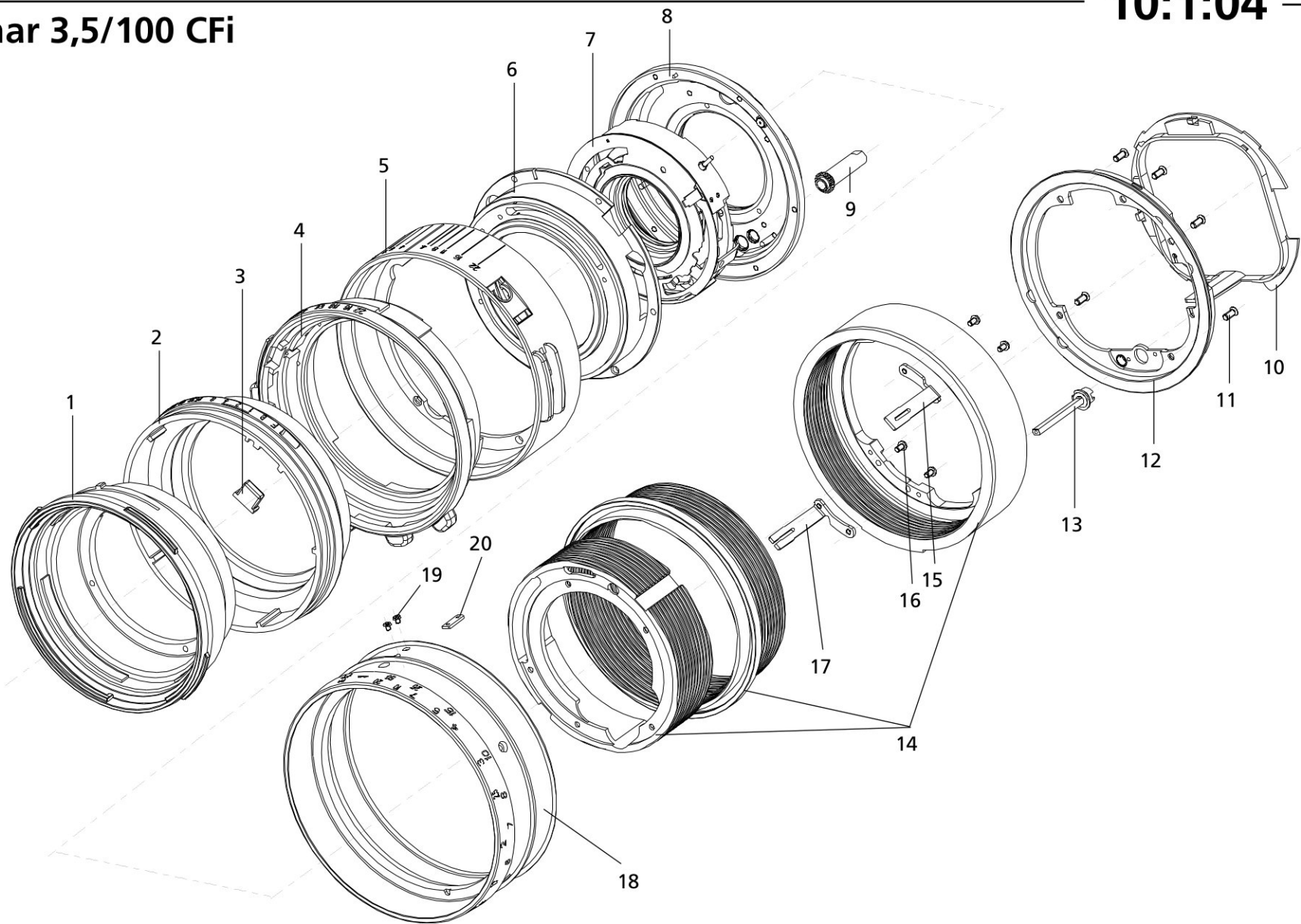
10:1:02



Pos No.	Pcs	Spare Part No.	Description	Remark
1	1	000000-1034-425	Holding ring	has to be exchanged together with shutter mount Details: look at 05:1:05 - 05:1:06 has to be exchanged together with case
2	1	000000-1034-426	Setting ring	
3	1	000000-1034-427	F-knob	
4	1	000000-1038-867	Diaphragm clutch ring	
5	1	000000-1038-951	Depth of field ring	
6	1	000000-1034-793	Case + shutter mount	
7	1	000000-1034-433	Shutter unit	
8	1	000000-1034-793	Shutter mount + case	
9	1	109950-0594-000	Telescope bush	
10	1	000000-1038-869	Light tunnel	
11	5	000000-0069-974	Screw	
12	1	000000-1015-939	Bayonet plate	
13	1	109950-0806-000	Telescope shaft	
14	1	000000-1038-952	Focusing mount, complete	
15	1	000000-1038-872	Guide bar	
16	4	000000-0093-535	Screw	
17	1	000000-1038-873	Guide bar	
18	1	000000-1038-874	Focusing ring	
19	2	000000-0098-795	Screw	
20	1	109950-0481-000	Stop	

10:1:04

Planar 3,5/100 CFi



**Carl Zeiss**

**Planar 3,5/100 CFi**

**10:2:01**

Pos No.	Pcs	Tool No.	Former Tool No.	Description	Remark
1	1	102165-8005-906	-	Wrench for front element	
2	1	000000-1054-354	102166-8006-903	Wrench for rear element	

### Planar 3,5/100 CFi

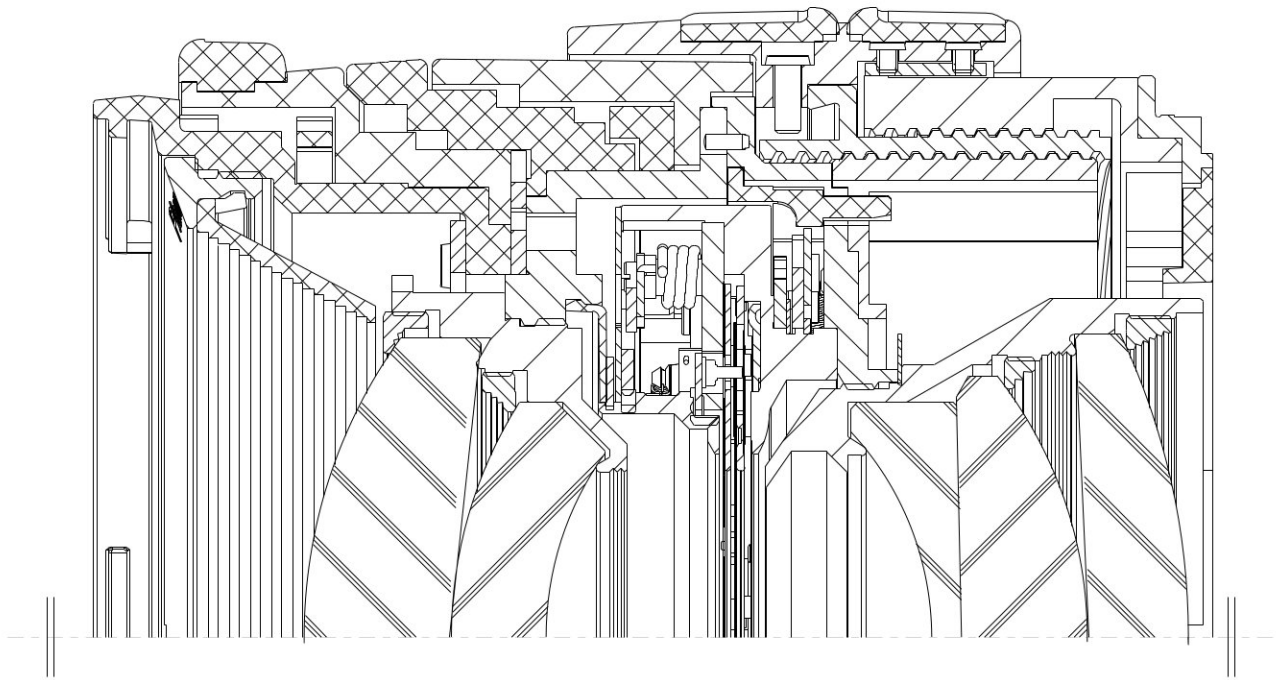


Fig. 10:3:01/1

## Mounting and dismounting of focusing mount

**Recommendation:** Before dismounting the focusing mount mark the positions between the three parts.

**Focusing mount 000000-1038-952**

Used for the following type: Planar 3,5/100

- Screw together threaded ring (10:3:02/1-1) and flange (10:3:02/1-2) until the total length is  $28 \pm 0.05$  mm.
- Fit in flange (10:3:02/1-2) according to 10:3:02/2.
- Mount one guide bar (turn the carrier to fit in the threads) and measure dimension A.
- In case of deviation: Dismount guide bar, unscrew flange (10:3:02/1-2) and screw it into the next thread.

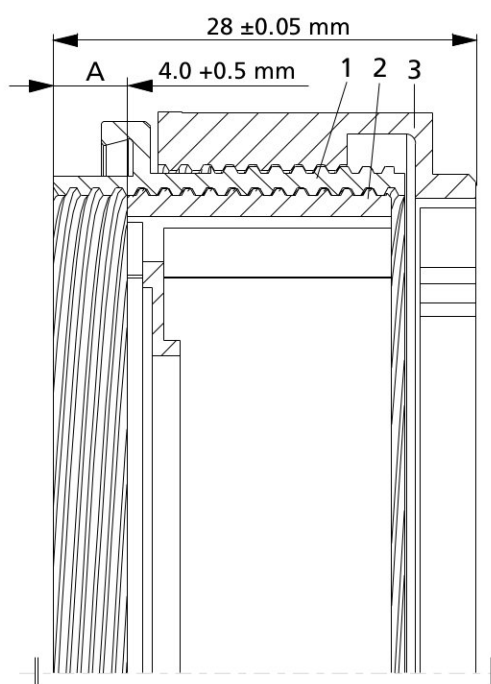


Fig. 10:3:02/1

1 Threaded ring  
2 Flange  
3 Carrier

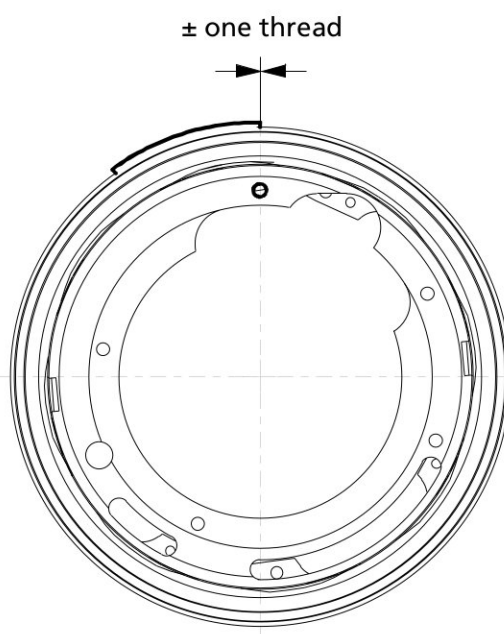
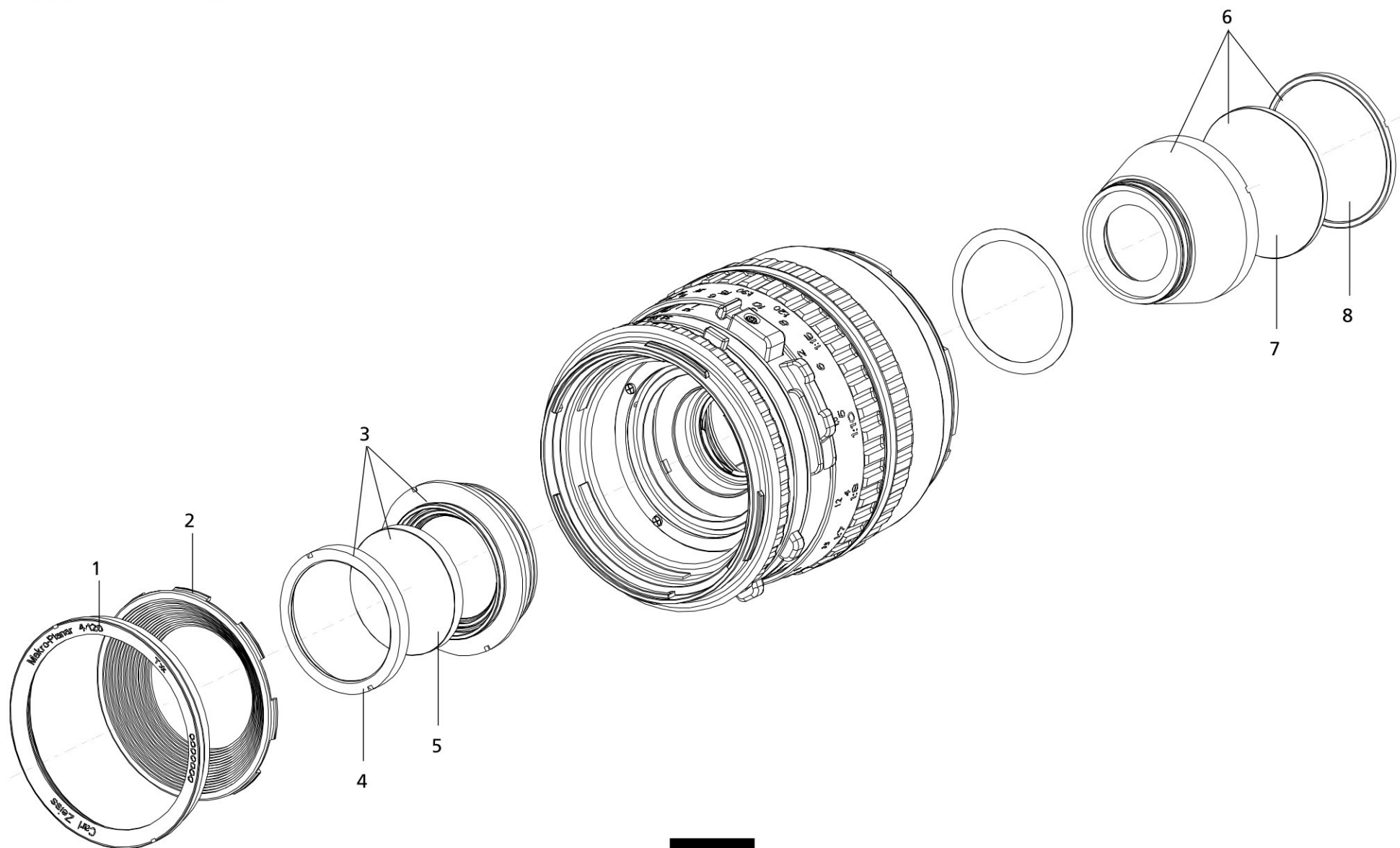


Fig. 10:3:02/2

Pos No.	Pcs	Spare Part No.	Description	Remark
1	1	102165-0011-310	Engraved ring	
2	1	107836-0016-000	Snap ring	
3	1	000000-1004-983	Front lens element	
4	1	107836-0011-000	Lens holding ring	
5	1	107836-0001-010	Front lens	
6	1	000000-1005-010	Rear lens element	
7	1	107836-0006-000	Rear lens	
8	1	107836-0015-000	Lens holding ring	

11:1:02

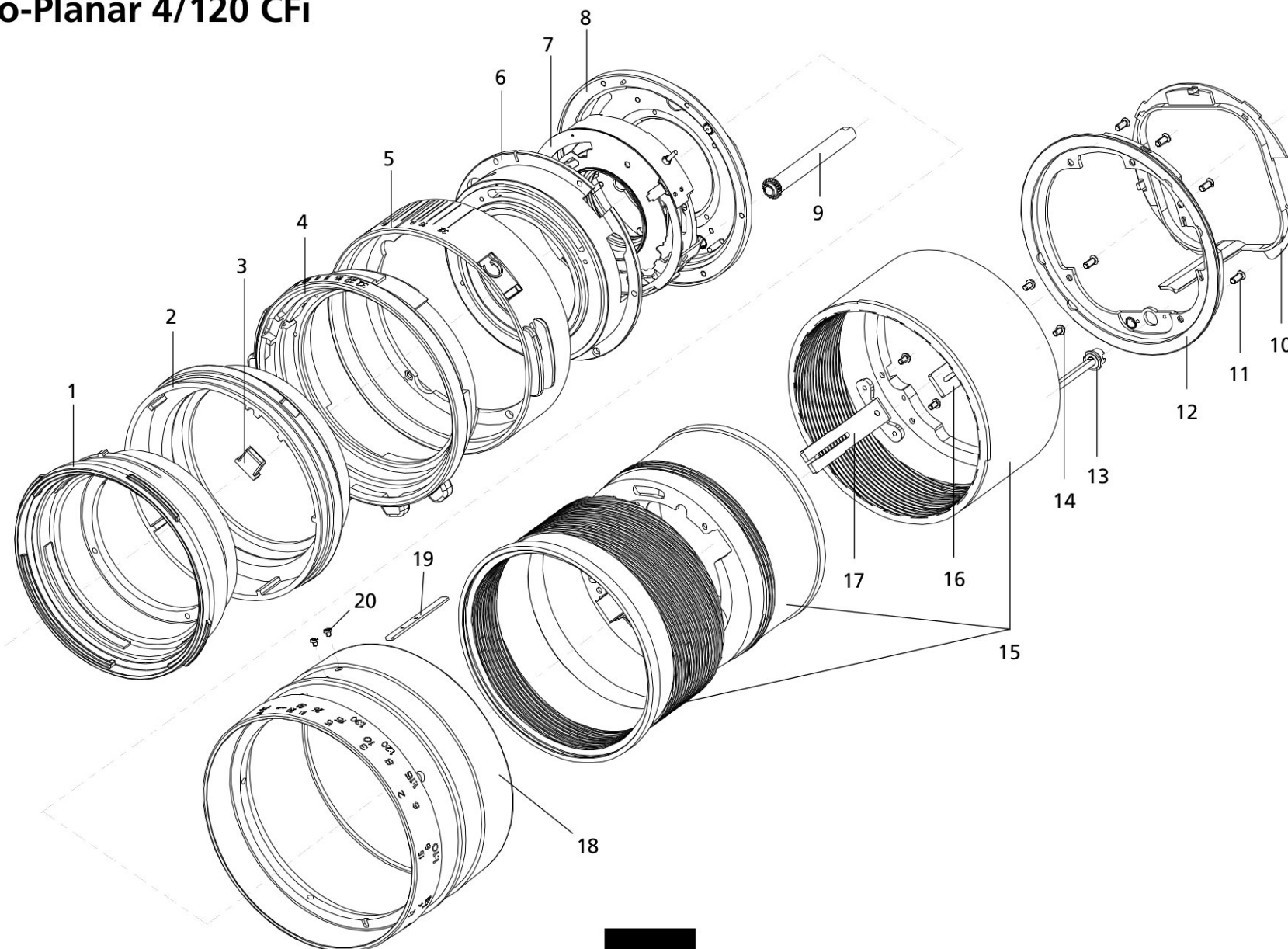
## Makro-Planar 4/120 CFi



Pos No.	Pcs	Spare Part No.	Description	Remark
1	1	000000-1034-425	Holding ring	
2	1	000000-1034-426	Setting ring	
3	1	000000-1034-427	F-knob	
4	1	000000-1034-202	Diaphragm clutch ring	
5	1	000000-1039-083	Depth of field ring	
6	1	000000-1034-793	Case + shutter mount	has to be exchanged together with shutter mount
7	1	000000-1039-085	Shutter unit	has to be exchanged together with case
8	1	000000-1034-793	Shutter mount + case	
9	1	109950-0592-000	Telescope bush	
10	1	100349-1072-000	Light tunnel	
11	5	000000-0069-974	Screw	
12	1	000000-1015-939	Bayonet plate	
13	1	109950-0644-000	Telescope shaft	
14	4	000000-0093-535	Screw	
15	1	000000-1034-209	Focusing mount, complete	
16	1	000000-1034-207	Guide bar	
17	1	000000-1034-208	Guide bar	
18	1	000000-1034-205	Focusing ring	
19	1	000000-1034-204	Stop	
20	2	000000-0098-795	Screw	

11:1:04

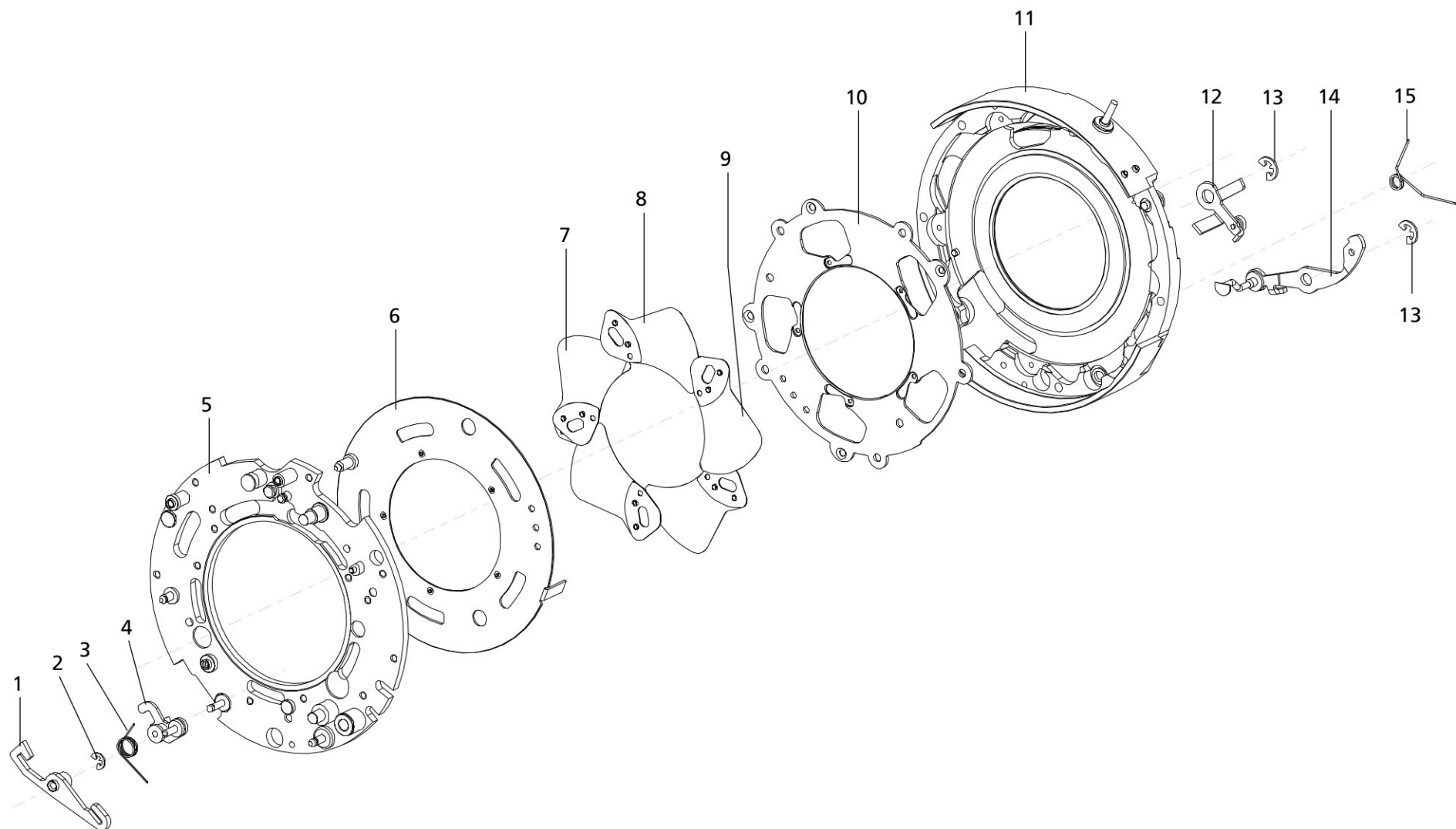
# Makro-Planar 4/120 CFi



Pos No.	Pcs	Spare Part No.	Description	Remark
1	1	109950-0652-000	Diaphragm switch lever	
2	1	000000-0007-701	Locking washer	
3	1	109950-0651-000	Control pawl spring	
4	1	109950-8050-000	Control pawl, riveted	
5	1	109950-0359-000	Base plate	
6	1	109950-0417-000	Blade opening ring	
7	1	109950-0128-000	Blade	
8	3	109950-0034-000	Blade	
9	1	109950-0755-000	Blade	
10	1	109950-0416-000	Blade cover	
11	1	102211-8551-000	Case, riveted	
12	1	109950-8049-000	Control lever, riveted	
13	1+1	000000-0064-668	Locking washer	
14	1	109950-8048-000	F-locking lever	
15	1	109950-0650-000	F- and control lever spring	

11:1:06

## Makro-Planar 4/120 CFi



**Carl Zeiss**

**Makro-Planar 4/120 CFi**

**11:2:01**

Pos No.	Pcs	Tool No.	Former Tool No.	Description	Remark
1	1	000000-1054-355	107836-8004-906	Wrench for front element	
2	1	000000-1054-356	107836-8005-906	Wrench for rear element	

## Makro-Planar 4/120 CFi

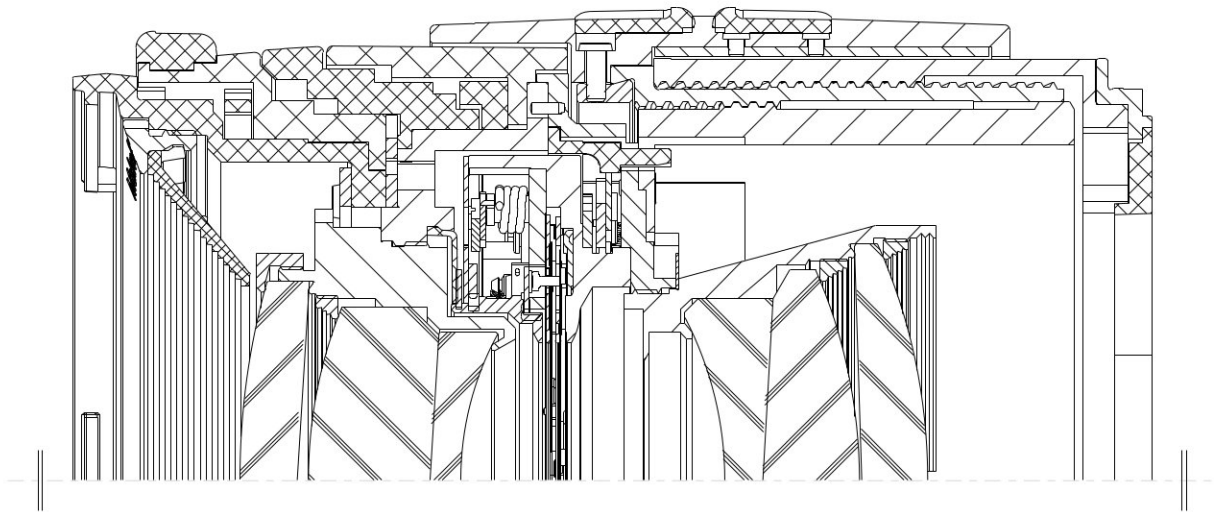


Fig. 11:3:01/1

## Mounting and dismounting of focusing mount

**Recommendation:** Before dismounting the focusing mount mark the positions between the three parts.

**Focusing mount 000000-1034-209**

Used for the following types:    Makro-Planar    4/120  
  Sonnar                4/180

- Screw together threaded ring (11:3:02/2-1) and flange (11:3:02/2-2) until face (Pos. B) is even.
- Fit in both parts into the carrier (11:3:02/2-3) according to 11:3:02/1 and screw in until the end.
- Mount one guide bar (turn the carrier to fit in the threads) and measure dimension A.
- In case of deviation: Dismount guide bar, unscrew threaded ring and flange and screw them into the next thread.

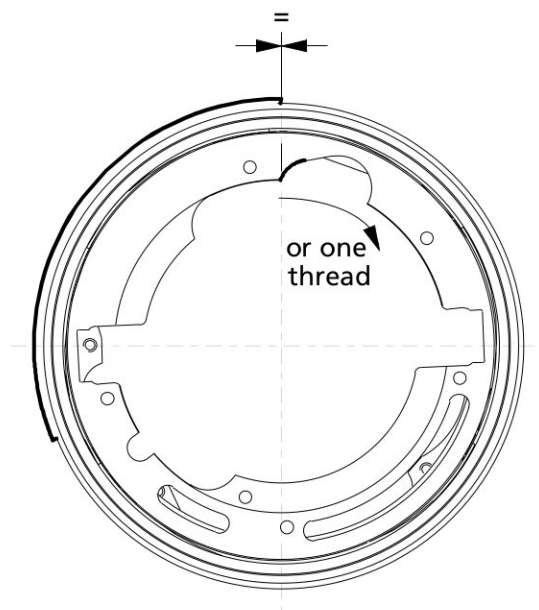


Fig. 11:3:02/1

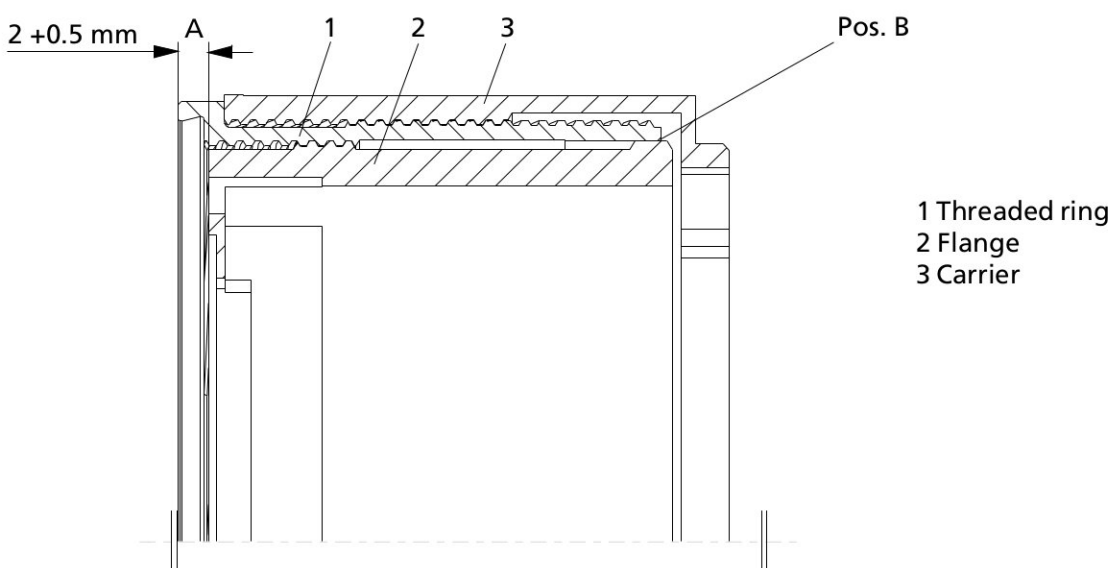
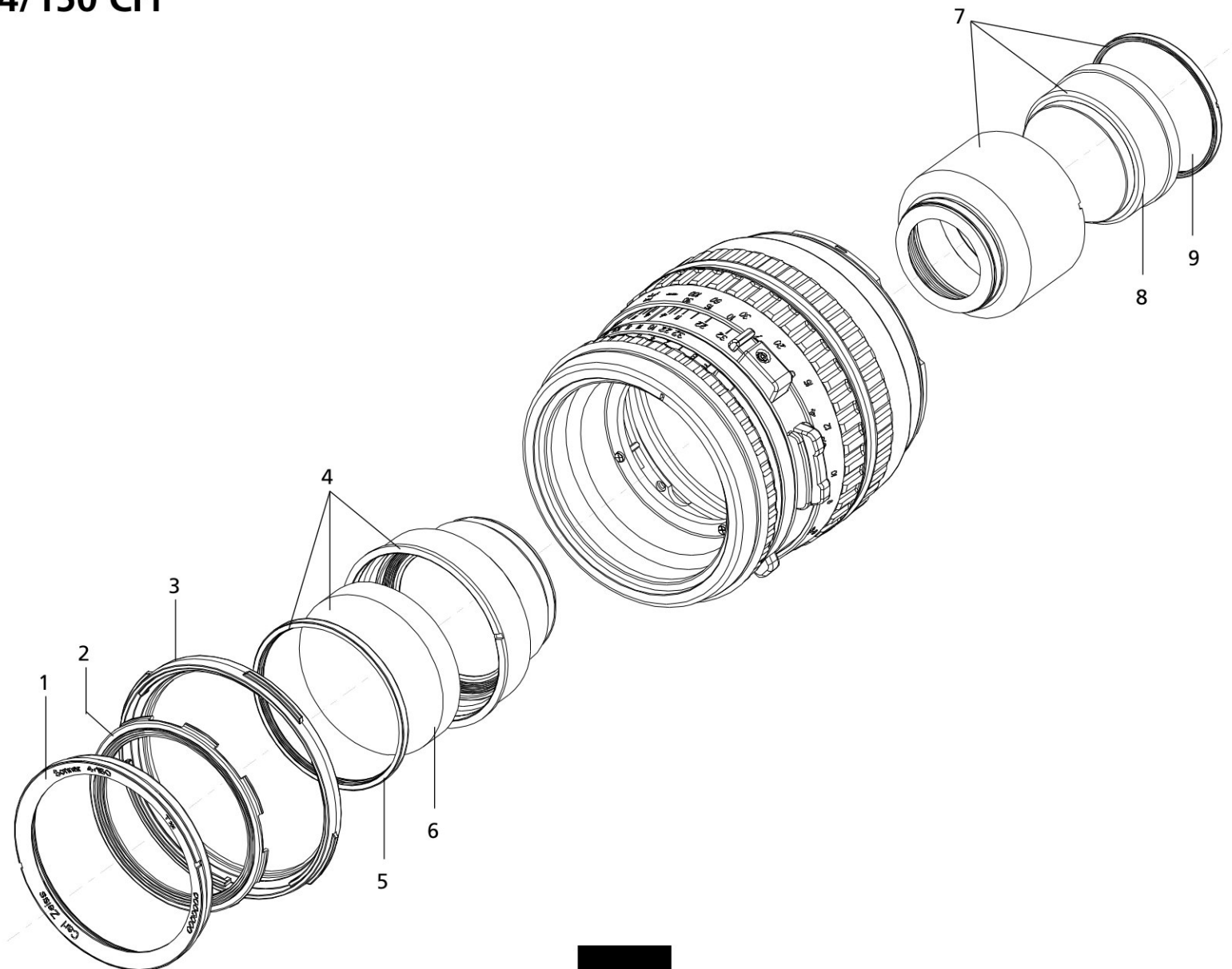


Fig. 11:3:02/2

Pos No.	Pcs	Spare Part No.	Description	Remark
1	1	102165-0011-355	Engraved ring	
2	1	107823-0012-020	Snap ring	
3	1	102165-1010-000	Bayonet	
4	1	101114-8005-000	Front lens element	
5	1	101114-0014-000	Lens holding ring	
6	1	101025-0301-000	Front lens	
7	1	000000-1010-397	Rear lens element	
8	1	101025-8121-010	Rear lens	
9	1	101025-0217-000	Lens holding ring	

# Sonnar 4/150 CFi

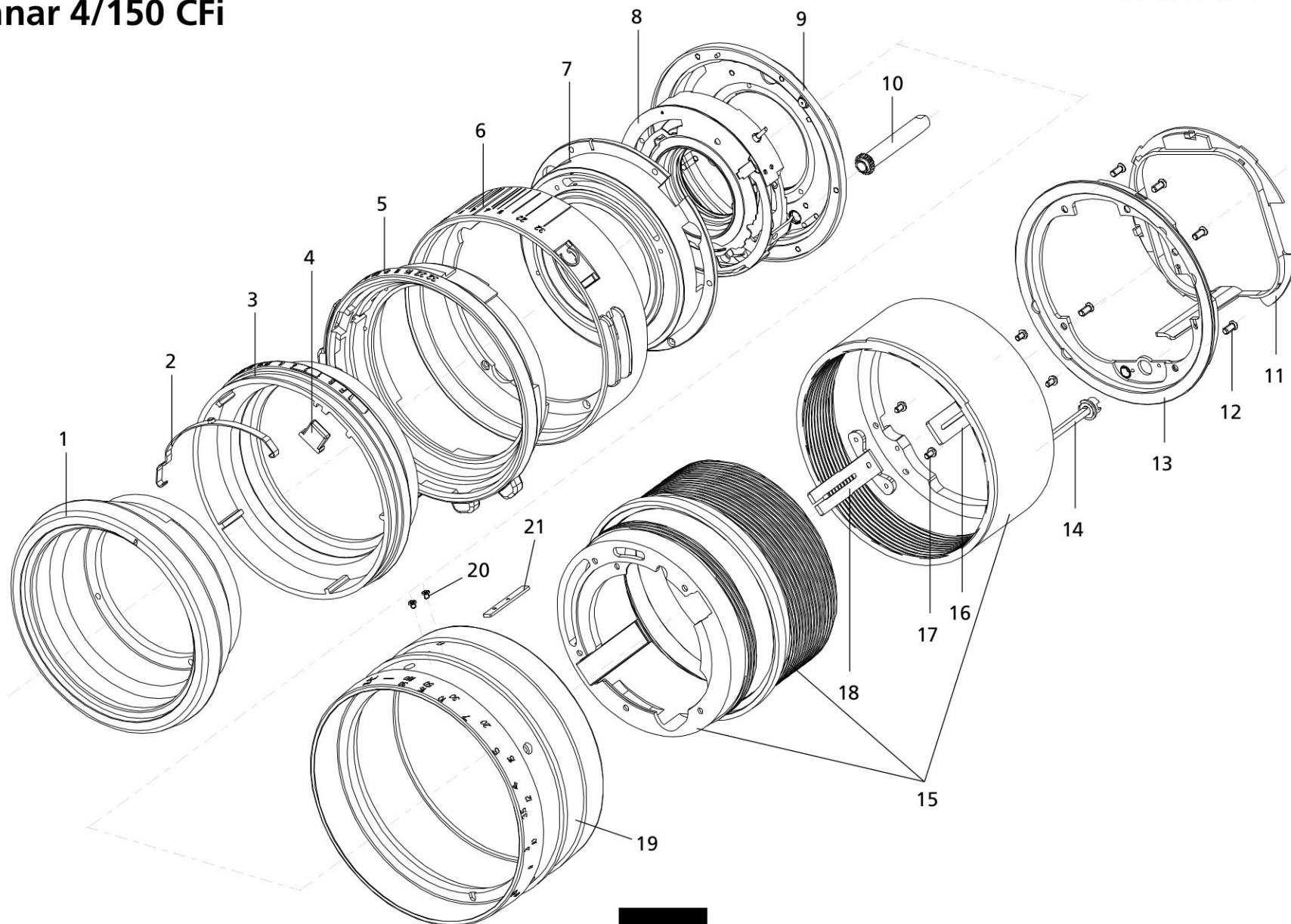
12:1:02



Pos No.	Pcs	Spare Part No.	Description	Remark
1	1	000000-1039-114	Holding ring	has to be exchanged together with shutter mount Details: look at 11:1:05 - 11:1:06 has to be exchanged together with case
2	1	107882-8560-000	Snap in spring	
3	1	000000-1034-426	Setting ring	
4	1	000000-1034-427	F-knob	
5	1	000000-1039-115	Diaphragm clutch ring	
6	1	000000-1039-116	Depth of field ring	
7	1	000000-1034-793	Case + shutter mount	
8	1	000000-1039-085	Shutter unit	
9	1	000000-1034-793	Shutter mount + case	
10	1	109950-0581-000	Telescope bush	
11	1	100349-1072-000	Light tunnel	
12	5	000000-0069-974	Screw	
13	1	000000-1015-939	Bayonet plate	
14	1	109950-0582-000	Telescope shaft	
15	1	000000-1039-118	Focusing mount, complete	
16	1	000000-1039-119	Guide bar	
17	4	000000-0093-535	Screw	
18	1	000000-1039-120	Guide bar	
19	1	000000-1039-121	Focusing ring	
20	2	000000-0098-795	Screw	
21	1	000000-1015-942	Stop	

12:1:04

# Sonnar 4/150 CFi



**Carl Zeiss**

**Sonnar 4/150 CFI**

**12:2:01**

Pos No.	Pcs	Tool No.	Former Tool No.	Description	Remark
1	1	101114-8005-902	-	Wrench for front element	
2	1	101025-0000-924	-	Wrench for rear element	

### Sonnar 4/150 CFi

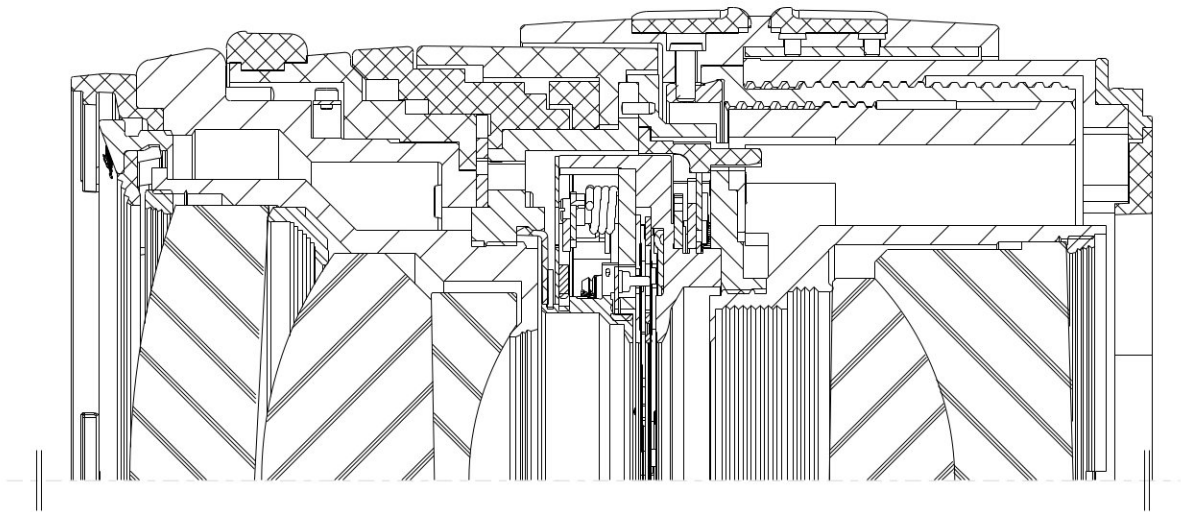


Fig. 12:3:01/1

## Mounting and dismounting of focusing mount

**Recommendation:** Before dismounting the focusing mount mark the positions between the three parts.

**Focusing mount 000000-1039-118**

Used for the following type: Sonnar 4/150

- Screw together threaded ring (12:3:02/2-1) and flange (12:3:02/2-2) until face (Pos. B) is even.
- Fit in both parts into the carrier (12:3:02/2-3) according to 12:3:02/1 and screw in until the end.
- Mount one guide bar (turn the carrier to fit in the threads) and measure dimension A.
- In case of deviation: Dismount guide bar, unscrew threaded ring and flange and screw them into the next thread.

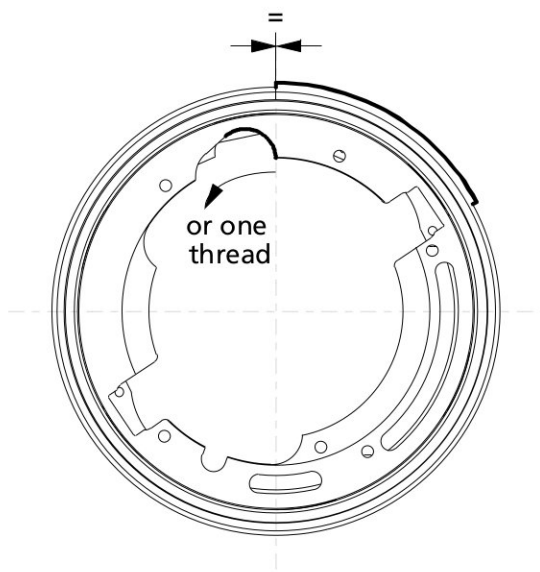


Fig. 12:3:02/1

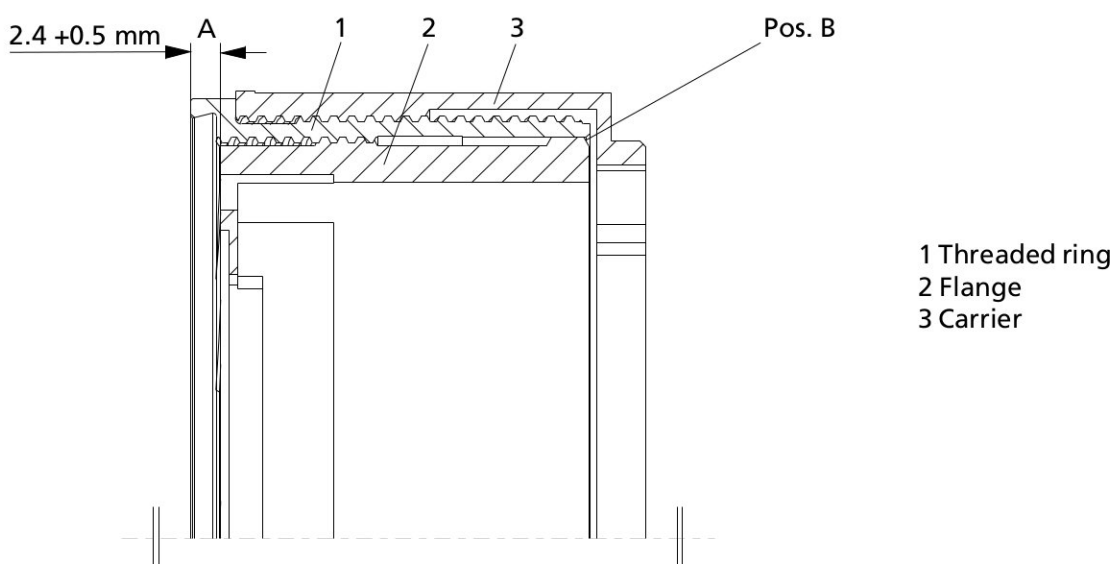
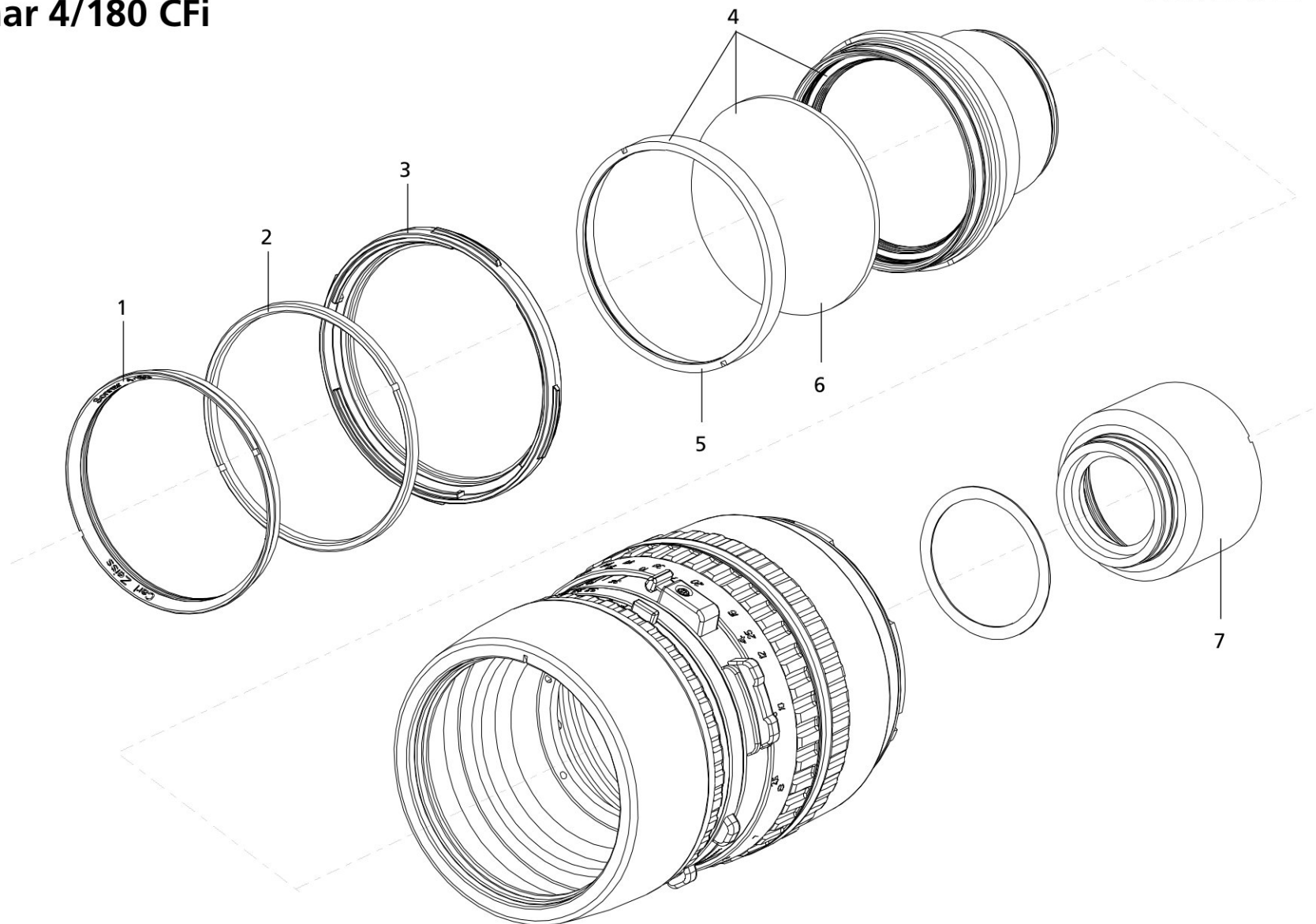


Fig. 12:3:02/2

Pos No.	Pcs	Spare Part No.	Description	Remark
1	1	000000-1004-238	Engraved ring	
2	1	104532-1012-000	Holding ring	
3	1	102165-1010-000	Bayonet	
4	1	000000-1005-261	Front lens element	
5	1	000000-1004-240	Lens holding ring	
6	1	101128-0001-000	Front lens	
7	1	000000-1004-237	Rear lens element	

# Sonnar 4/180 CFi

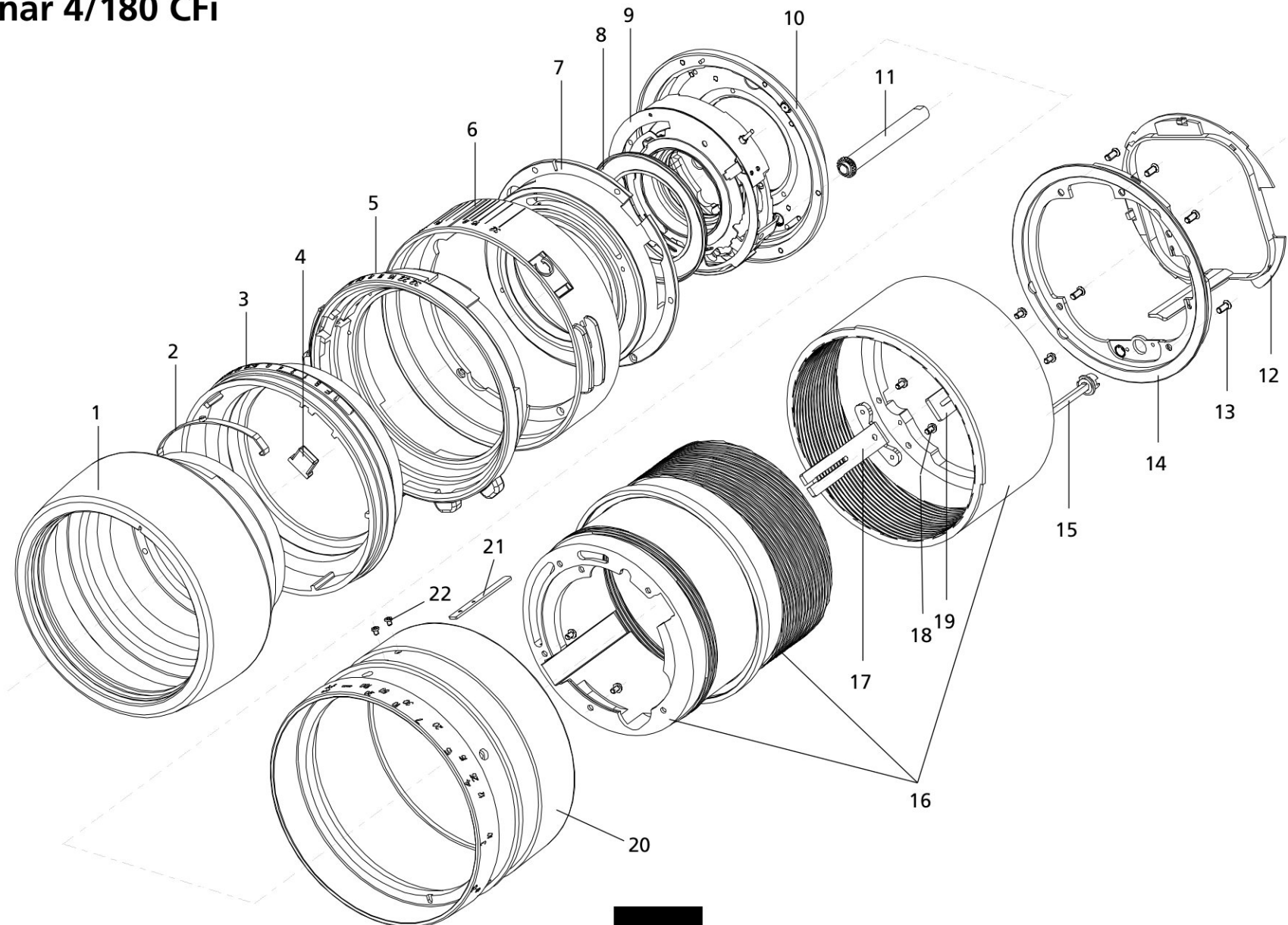
13:1:02



Pos No.	Pcs	Spare Part No.	Description	Remark
1	1	000000-1039-212	Holding ring	<p>has to be exchanged together with shutter mount</p> <p>Details: look at 11:1:05 - 11:1:06</p> <p>has to be exchanged together with case</p>
2	1	107882-8560-000	Snap in ring	
3	1	000000-1034-426	Setting ring	
4	1	000000-1034-427	F-knob	
5	1	000000-1039-115	Diaphragm clutch ring	
6	1	000000-1039-213	Depth of field ring	
7	1	000000-1039-214	Case + shutter mount	
8	1	109950-0429-000	Cover plate	
9	1	000000-1039-085	Shutter unit	
10	1	000000-1039-214	Shutter mount + case	
11	1	109950-0592-000	Telescope bush	
12	1	100349-1072-000	Light tunnel	
13	1	000000-0069-974	Screw	
14	1	000000-1015-939	Bayonet plate	
15	1	109950-0644-000	Telescope shaft	
16	1	000000-1034-209	Focusing mount, complete	
17	1	000000-1034-207	Guide bar	
18	4	000000-0093-535	Screw	
19	1	000000-1034-208	Guide bar	
20	1	000000-1039-215	Focusing ring	
21	1	000000-1039-216	Stop	
22	2	000000-0098-795	Screw	

# Sonnar 4/180 CFi

13:1:04



**Carl Zeiss**

**Sonnar 4/180 CFI**

**13:2:01**

Pos No.	Pcs	Tool No.	Former Tool No.	Description	Remark
1	1	101128-0000-901	-	Wrench for front element	
2	1	101128-0000-902	-	Wrench for rear element	
3	1	101128-0016-901	-	Wrench for engraved ring	
4	1	104532-0000-901	-	Wrench for holding ring	

### Sonnar 4/180 CFi

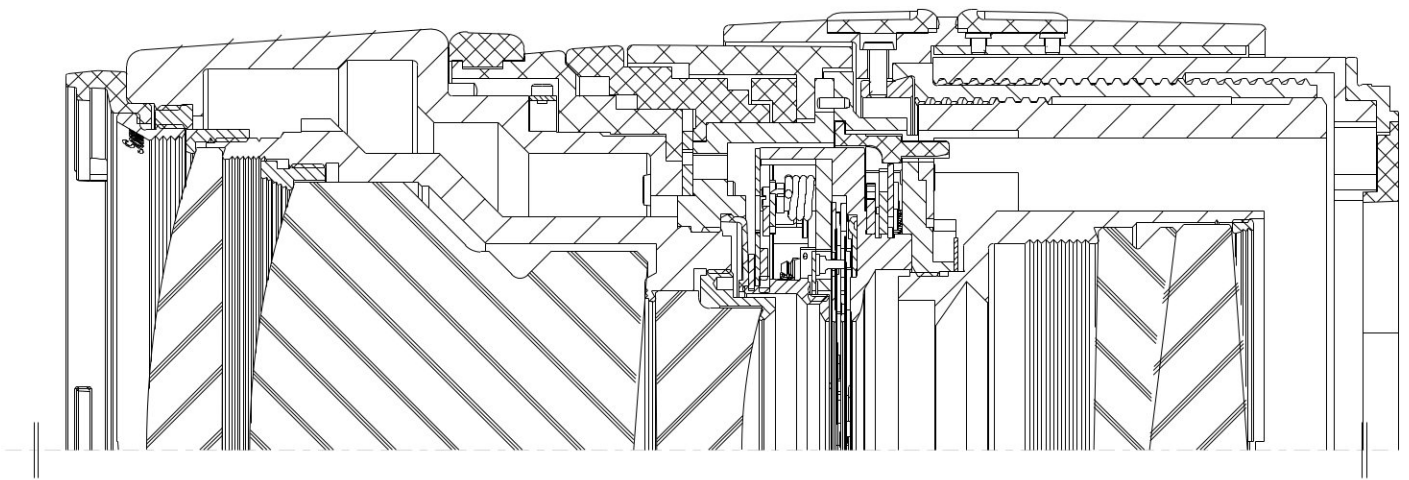


Fig. 13:3:01/1

## Mounting and dismounting of focusing mount

**Recommendation:** Before dismounting the focusing mount mark the positions between the three parts.

**Focusing mount 000000-1034-209**

Used for the following types:   Sonnar           4/180  
  Makro-Planar   4/120

- Screw together threaded ring (13:3:02/2-1) and flange (13:3:02/2-2) until face (Pos. B) is even.
- Fit in both parts into the carrier (13:3:02/2-3) according to 13:3:02/1 and screw in until the end.
- Mount one guide bar (turn the carrier to fit in the threads) and measure dimension A.
- In case of deviation: Dismount guide bar, unscrew threaded ring and flange and screw them into the next thread.

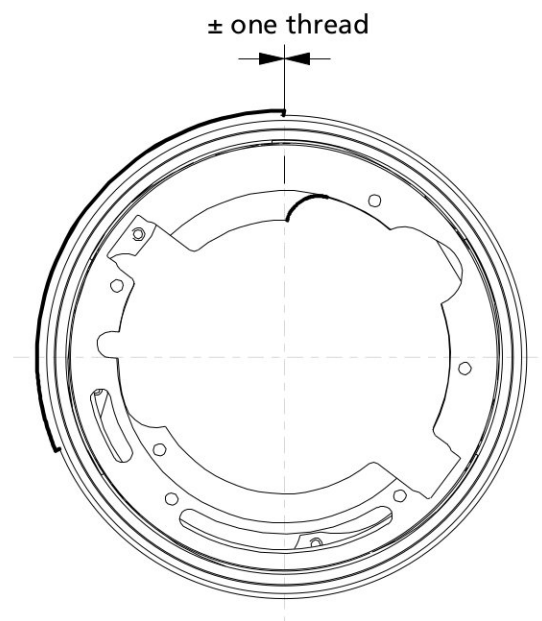


Fig. 13:3:02/1

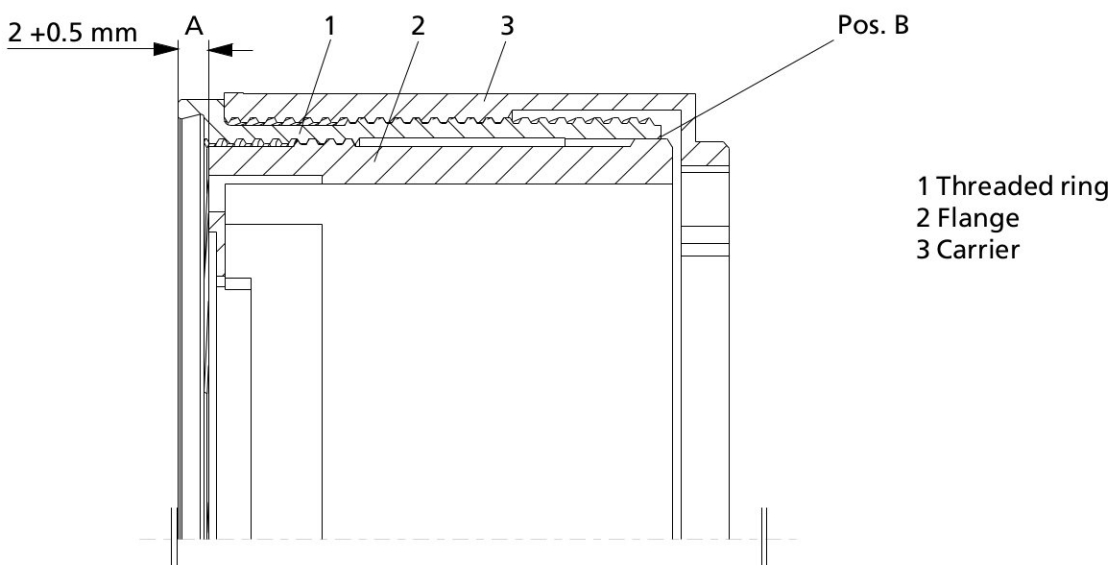
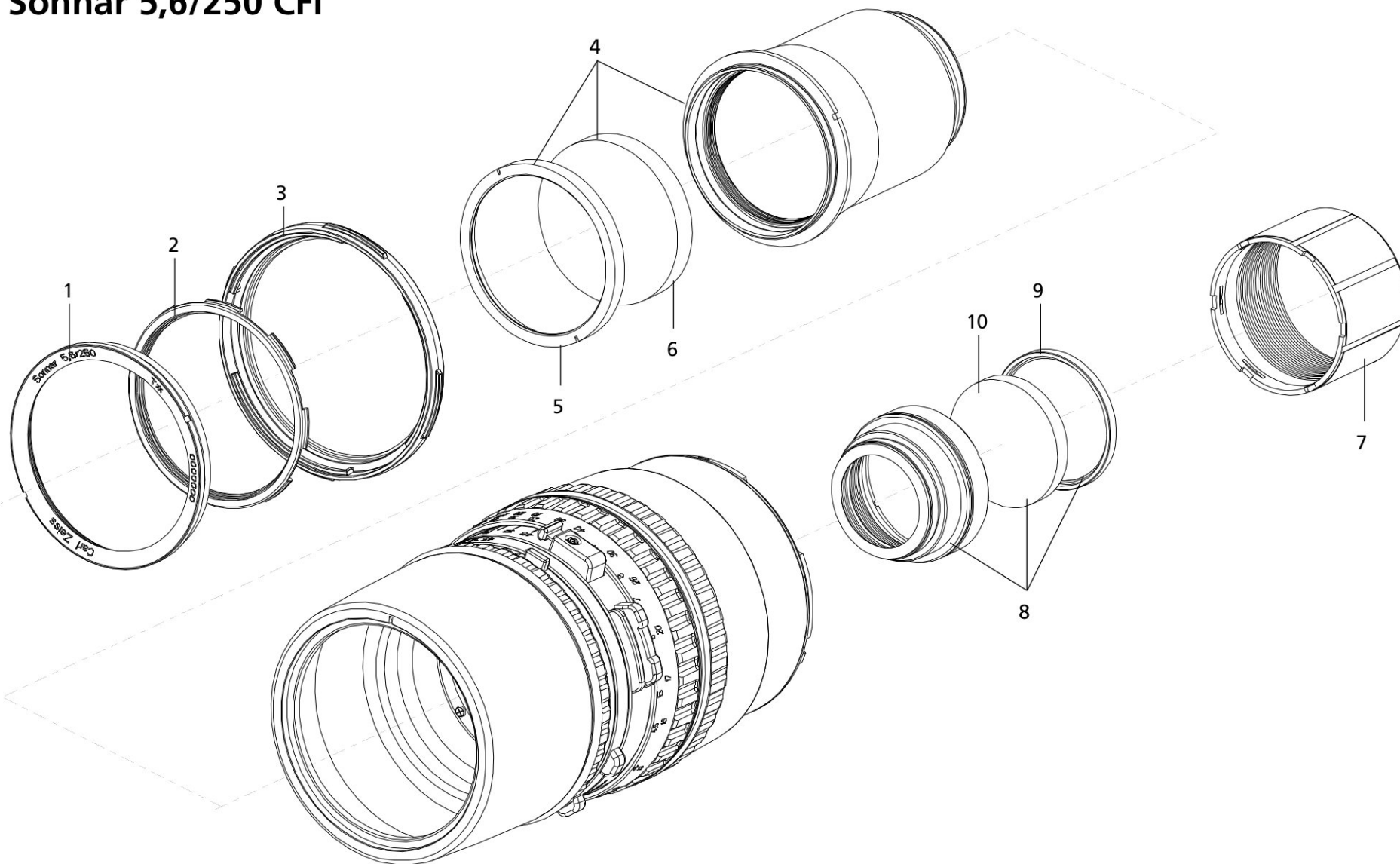


Fig. 13:3:02/2

Pos No.	Pcs	Spare Part No.	Description	Remark
1	1	000000-1003-569	Engraved ring	
2	1	102165-0012-010	Snap ring	
3	1	102165-1010-000	Bayonet	
4	1	000000-1003-529	Front lens element	
5	1	000000-1003-051	Lens holding ring	
6	1	101007-0101-000	Front lens	
7	1	101115-0014-000	Snap ring	
8	1	000000-1003-535	Rear lens element	
9	1	101115-0013-000	Lens holding ring	
10	1	101007-0304-010	Rear lens	

14:1:02

# Sonnar 5,6/250 CFI



Pos No.	Pcs	Spare Part No.	Description	Remark
1	1	000000-1039-232	Holding ring	<p>has to be exchanged together with shutter mount</p> <p>Details: look at 11:1:05 - 11:1:06</p> <p>has to be exchanged together with case</p>
2	1	107882-8560-000	Snap in spring	
3	1	000000-1034-426	Setting ring	
4	1	000000-1034-427	F-knob	
5	1	000000-1039-233	Diaphragm clutch ring	
6	1	000000-1039-234	Depth of field ring	
7	1	000000-1039-214	Case + shutter mount	
8	1	109950-0429-000	Cover plate	
9	1	000000-1039-085	Shutter unit	
10	1	000000-1039-214	Shutter mount + case	
11	1	109950-0591-000	Telescope bush	
12	1	101137-1999-000	Telescope bush extension	
13	1	100349-1072-000	Light tunnel	
14	5	000000-0069-974	Screw	
15	1	000000-1015-939	Bayonet plate	
16	1	109950-0653-000	Telescope shaft	
17	4	000000-0093-535	Screw	
18	1	000000-1039-237	Focusing mount, complete	
19	1	000000-1039-238	Guide bar	
20	1	000000-1039-239	Guide bar	
21	1	000000-1039-241	Focusing ring	
22	1	000000-1039-242	Stop	
23	2	000000-0098-795	Screw	



**Carl Zeiss**

**Sonnar 5,6/250 CFi**

**14:2:01**

Pos No.	Pcs	Tool No.	Former Tool No.	Description	Remark
1	1	000000-1054-357	101115-8001-901	Wrench for front element	
2	1	101115-8002-903	-	Wrench for rear element	

## Sonnar 5,6/250 CFi

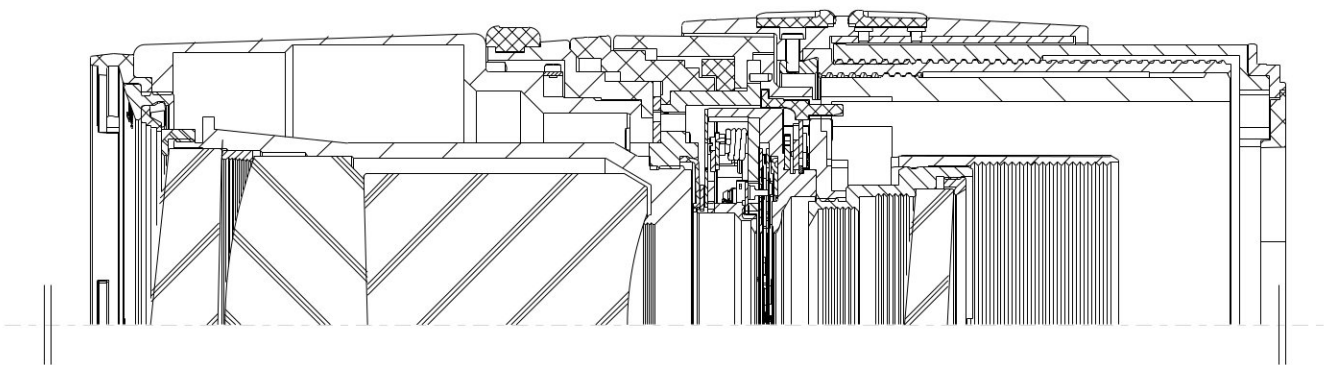


Fig. 14:03:01/1

## Mounting and dismounting of focusing mount

**Recommendation:** Before dismounting the focusing mount mark the positions between the three parts.

**Focusing mount 000000-1039-237**

Used for the following type: Sonnar 5,6/250

- Screw together threaded ring (14:3:02/2-1) and flange (14:3:02/2-2) until face (Pos. B) is even.
- Fit in both parts into the carrier (14:3:02/2-3) according to 14:3:02/1 and screw in until the end.
- Mount one guide bar (turn the carrier to fit in the threads) and measure dimension A.
- In case of deviation: Dismount guide bar, unscrew threaded ring and flange and screw them into the next thread.

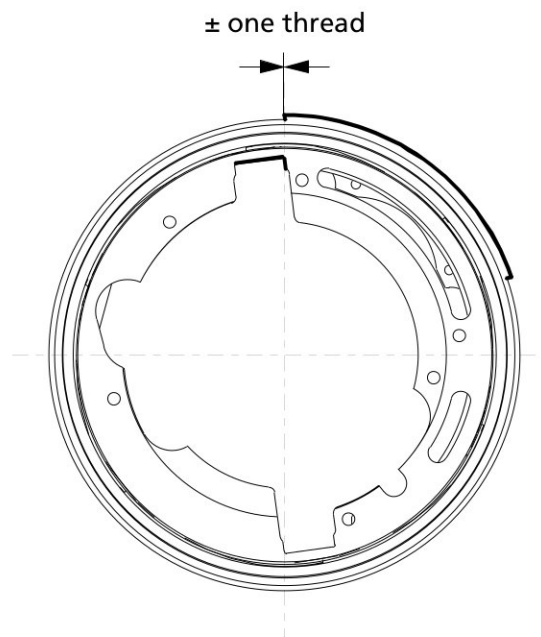


Fig. 14:3:02/1

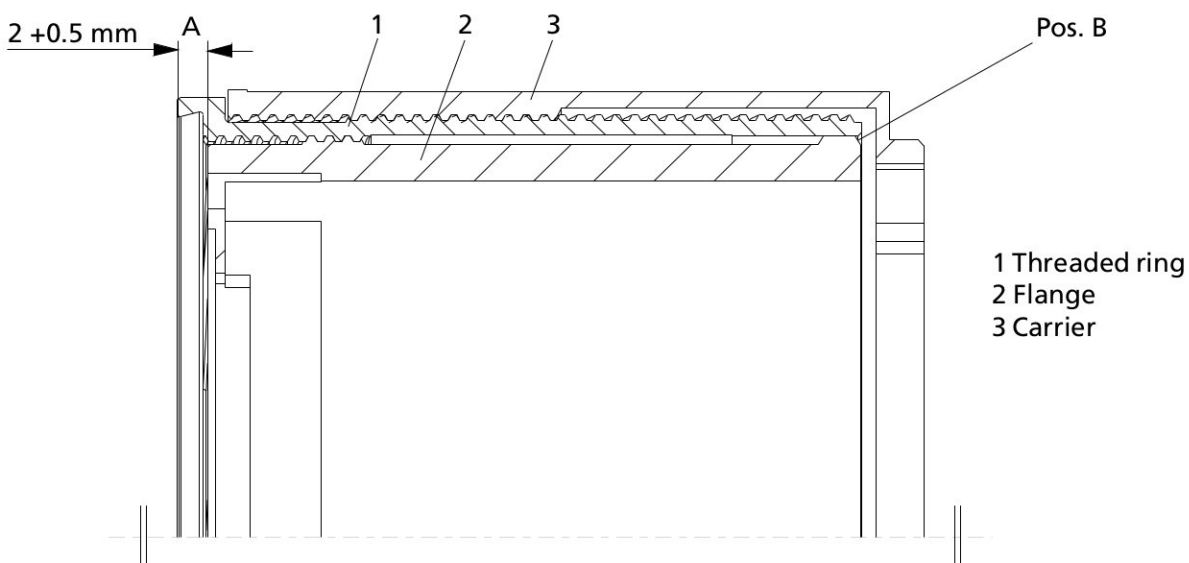
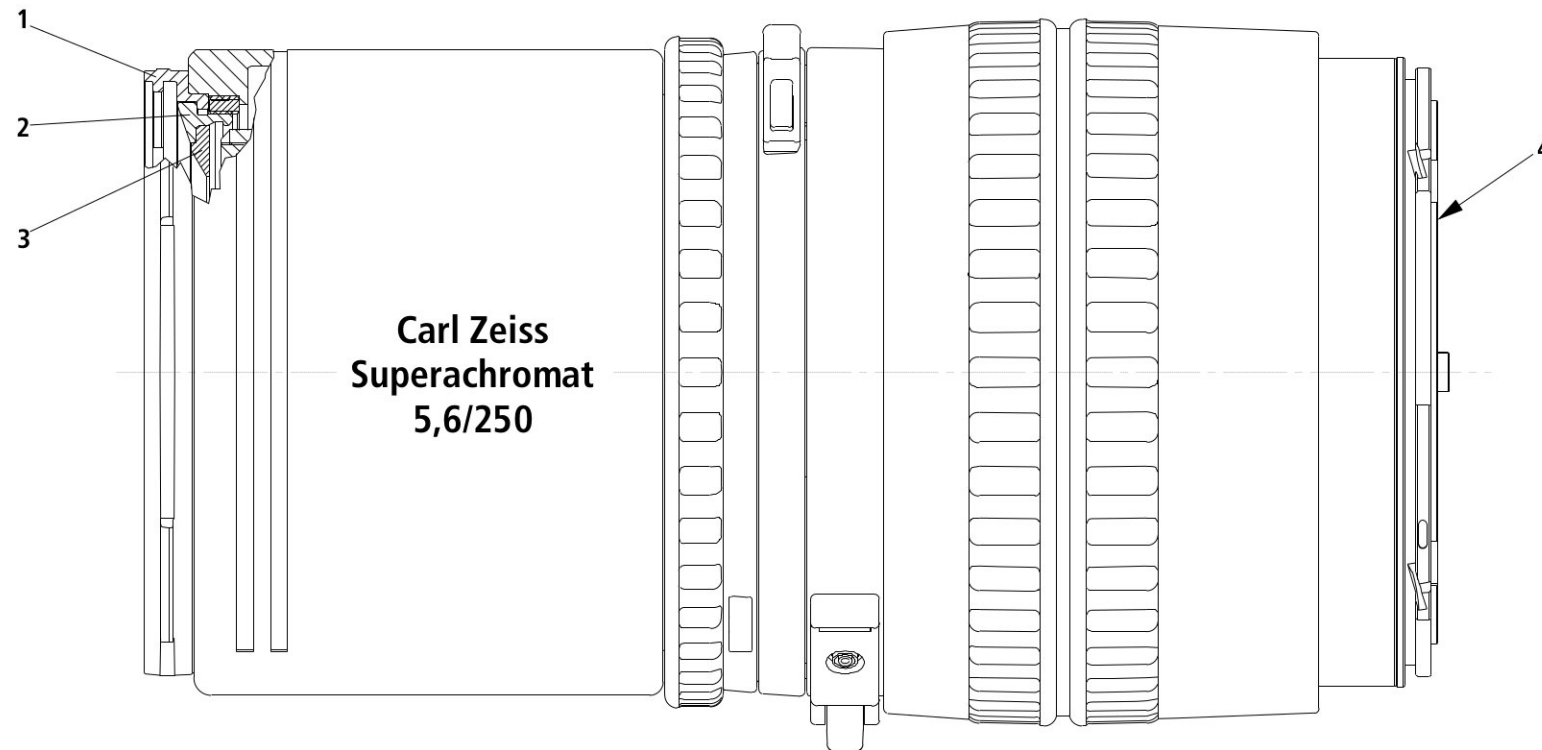


Fig. 14:3:02/2

Pos No.	Pcs	Spare Part No.	Description	Remark
1	1	102165-1010-000	Bayonet	(not figured)
2	1	102165-0011-000	Ring	
3	1	104552-1012-000	Ring	
4	1	100349-1072-000	Light tunnel	

# Sonnar-Superachromat 5,6/250 CFi



### Sonnar-Superachromat 5,6/250 CFi

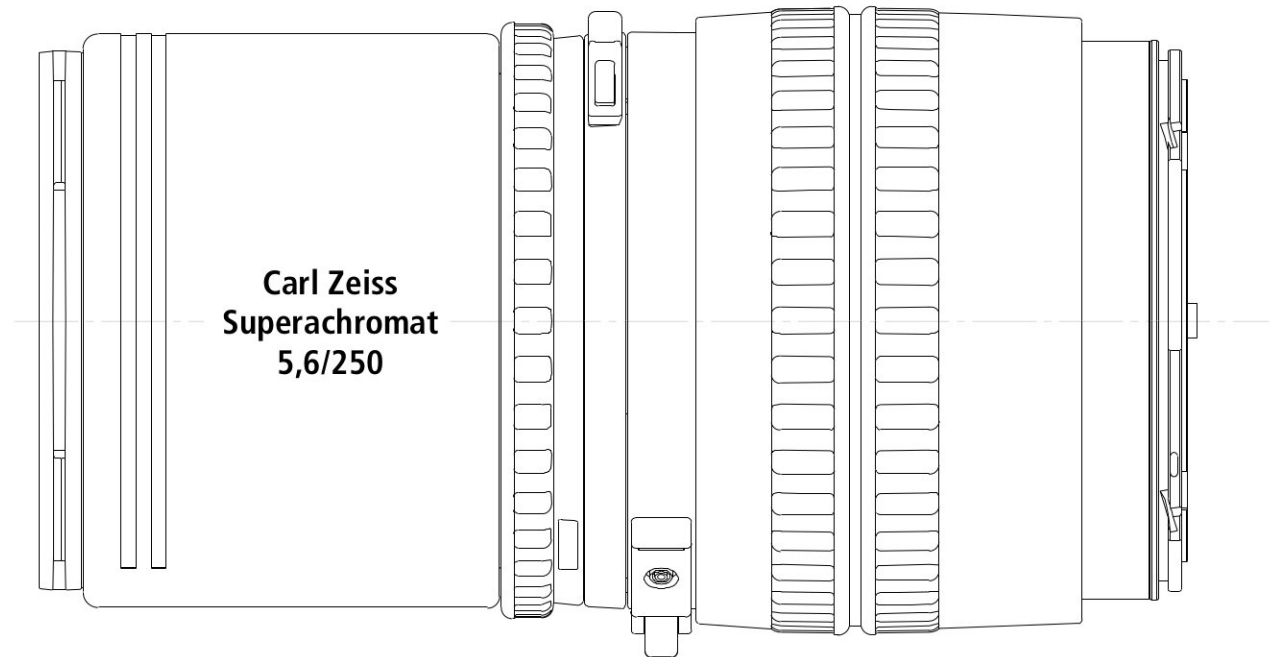


Fig. 15:3:01/1

Each lens has been adjusted individually. Repair works may not be carried out with the exception of the replacement of the parts mentioned in the spare part list of this lens. In case of damage please send the complete lens to:

Carl Zeiss  
D-73446 Oberkochen